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**UNCLASSIFIED- SCIENTIFIC INFORMATION
REPORT**

3 JULY 1959

1 OF 2



CENTRAL INTELLIGENCE AGENCY

4
**SCIENTIFIC
INFORMATION REPORT**



3 July 1959

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PLEASE NOTE

This report presents unevaluated information extracted from recently received publications of the USSR, Eastern Europe, and China. The information selected is intended to indicate current scientific developments and activities in the USSR, in the Sino-Soviet Orbit countries, and in Yugoslavia, and is disseminated as an aid to United States Government research.

SCIENTIFIC INFORMATION REPORT

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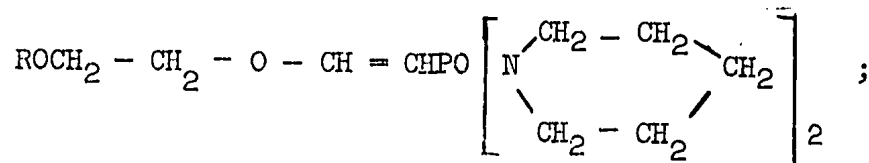
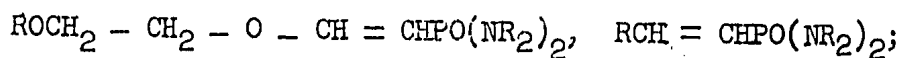
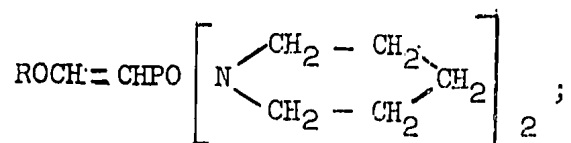
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I. CHEMISTRY

Fuels and Propellants1. Effect of Some Phosphorus-Containing Compounds On the Stability of Mineral Oil To Oxidation

"The Effect of Tetraalkyldiamides and Dipiperidides of Unsaturated Phosphinic Acids on the Antioxidation Properties of Mineral Oil," by K. K. Papok, K. N. Anisimov, B. S. Zuseva and N. Ye. Kolobova, Institute of Organochemical Compounds, Academy of Sciences USSR; Leningrad, Zhurnal Prikladnoy Khimii, Vol 32, No 2, Feb 59, pp 358-363

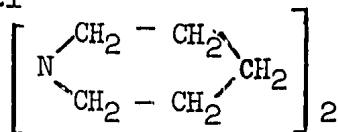
In this report results are presented of the study of the effect of diamides and dipiperidides of unsaturated phosphinic acids on the stability of MS-20 oil to oxidation. Compounds of the following types were synthesized for purposes of the investigation:



where R is equal to CH_3 , C_2H_5 , C_3H_7 , C_4H_9 or C_6H_5 .

The constants of the synthesized compounds including the boiling point, the refractive index, specific gravity, and their effects as shown by the thermal oxidation index, the volatility index, the active fraction index and the resin formation index of the oil are presented in four tables.

The best antioxidation properties were exhibited by dipiperididediamides of unsaturated phosphinic acids; as a result of the inclusion of the dipiperidide radical



to the compounds their antioxidation

properties are increased.

The introduction of phenyl and phenoxy groups increases the antioxi-
dation properties of tetraethyldiamides but does not have any effect on
tetrabutylidiamide and dipiperididediamide compounds.

The antioxi-dation properties are decreased in tetraethyldiamides and
tetrabutylidiamides when the length of the carbon radical in the group
(NR₂)₂ is increased from C₂ to C₄.

Tetraalkyldiamides and piperidides of unsaturated phosphinic acids
have better antioxi-dation properties than esters of unsaturated phos-
phinic acids.

Geochemistry

2. Publication of New Periodical on Geology of Ore Deposits

"From the Editorial Board," by A. G. Betekhtin, chief editor;
Moscow, Geologiya Rudnykh Mestorozhdeniy, No 1, Jan/Feb 59,
pp 3-4

In connection with the current Seven-Year Plan, the extent of geological
prospecting activities in the USSR will be increased by approximately 67%.
The greatest increases will be in prospecting for petroleum and natural gas
and also for deposits of rich and easily concentrated ores of ferrous and
nonferrous metals located in regions that are of economic advantage from the
standpoint of industrial developments.

To expedite work that will have to be done in connection with the ex-
pansion of available supplies of mineral raw materials the new journal must
contribute in every possible way to the advancement of theoretical knowledge
and of scientific research done by geological institutions of the USSR in
various fields related to ore deposits. More specifically, the following
types of activity will be of importance: discussion of scientific progress
in different fields of the geology of ore deposits (with reference to ores
containing metals, nonmetals), and rare and dispersed elements); treatment
of theoretical problems in the principal fields of science; general treatment
of problems pertaining to the formation of ore deposits; and publication of
new factual data that are of importance for the understanding of processes
of ore formation.

The general program of the journal is indicated by the following classifi-
cation of material that will be published in it:

(1) Problems pertaining to the regularities underlying processes of ore
formation and location of deposits in ore-bearing regions; characteristics of
metallogenic provinces and the geological structure of ore fields including
the structure of individual deposits;

- (2) Theoretical problems encountered in the study of ore deposits;
- (3) Problems pertaining to the development of methods for prospecting and investigating ore deposits;
- (4) The most important results obtained in the mineralogical investigation of ores;
- (5) The results of experimental work dealing with conditions under which ores form;
- (6) Reviews of progress made outside of the USSR comprising information on scientific work in the field of the geology of ore deposits carried out in countries of the people's democracies and capitalistic countries.

[SIR Note: The periodical is published by the Institute of the Geology of Mineral Deposits, Petrography, Mineralogy, and Geochemistry, Academy of Sciences USSR. The address of the institute is Staromonetnyy Pereulok 35, Moscow V-17. The Board of Editors consists of Academician A. G. Betekhtin, chief editor; O. D. Levitskiy, Corresponding Member Academy of Sciences USSR, deputy chief editor; F. I. Vol'fson, Doctor of Geologico-Mineralogical Sciences; G. A. Sokolov, Doctor of Geologico-Mineralogical Sciences; P. M. Tatarinov, Corresponding Member Academy of Sciences USSR; Ye. T. Shatalov, Doctor of Geologico-Mineralogical Sciences; F. K. Shipulin, Doctor of Geologico-Mineralogical Sciences; A. D. Genkin, Candidate of Geologico-Mineralogical Sciences, executive secretary. A table of contents in English is given at the end of the issue. There are no English-language abstracts].

Industrial Chemistry

3. More Extensive Application of Ultrasound in USSR Chemical Industry

"Decisions of the 21st Congress of the CPSU -- A Challenging Program for Workers in the Field of Chemical Machine Building" (unsigned article); Moscow, Khimicheskoye Mashinostroyeniye, No 2, Mar-Apr 59, pp 1-3

In connection with the expansion of chemical machine construction foreseen under the current Seven-Year Plan, new equipment for the chemical industry must be developed in the design and operation of which the latest achievements of science and technology will be utilized. This refers particularly to methods based on the application of radioelectronics, semiconductors, ultrasound, radioactive isotopes, etc.

Chemical equipment will have to be developed which utilizes ultrasound to improve the efficiency of extraction, mixing of liquid non-homogeneous systems, clarification of liquids by accelerating the precipitation of suspended particles, separation of emulsions, and many similar processes in chemical technology. One must also introduce into chemical technology advanced methods for the drying and calcination of chemical products suspended within a layer.

The conditions under which chemical equipment operates (exposure to corrosive media, a wide range of operating temperatures, and an extensive range of pressures from high vacuum to 2000 atmospheres) put new demands to construction materials and protective coatings for these materials. It will be necessary to expand the production of high-strength acid-resistant steels, clad ("two-layer") steels, titanium, tantalum, niobium, and other metals as well as alloys. In order to introduce successfully into chemical machine building the new metals and alloys that are to be used as construction materials, workers in the field of chemical machine building will have to develop novel methods of welding, cutting, treatment under pressure, etc.

4. Development of Cyclone Method

"Results of the Scientific Activity of the Academy of Sciences Kazakh SSR During 1958," by Academician Sh. Ch. Chokin, Academy of Sciences Kazakh SSR; Alma-Ata, Vestnik Akademii Nauk Kazakhskoy SSR, Vol 15, No 4 (169), Apr 59, pp 3-25

The Institute of Metallurgy and Enrichment, Academy of Sciences Kazakh SSR, has expanded work on the metallurgy of nonferrous and rare metals. In work done jointly with the Power Institute, it has successfully investigated the application of cyclone smelting in nonferrous metallurgy.

During 1958, the institute achieved reproducible conditions in the roasting and smelting of copper concentrates in the suspended state in work conducted at the Balkhash Copper Plant. The copper matte which is produced contains 30-60% of copper; i.e., the efficiency of the new process exceeds that of the conventional conversion in reverberatory furnaces by a factor of 1.5.

The Institute of Chemical Sciences, Academy of Sciences Kazakh SSR, has conducted on an experimental basis conversion of Karatau phosphorites by the cyclone method. The melted magnesium phosphates produced by this method do not contain any fluorine and are superior in quality to ordinary superphosphate and thermal phosphate.

5. Polyamides Derived From Aromatic Diamines and Adipic Acid

"Synthesis and Investigation of Mixed Polyamides Derived From Aromatic Diamines and Adipic Acid," by I. P. Losev, O. Ya. Fedotova, M. A. Askarov, and L. N. Sedov, Chair of Technology of High-Molecular Compounds, Moscow Chemicotechnological Institute imeni D. I. Mendeleev; Moscow, Nauchnyye Doklady Vyshey Shkoly - Khimiya i Khimicheskaya Tekhnologiya, No 2, Mar 59, pp 159-161

Three binary systems were investigated which consisted of mixed polyamides derived from 4,4'-diamino-3,3'-dimethyldiphenylmethane, its N,N'-diethyl-dipropyl-, and dibutyl derivatives, and adipic acid. It was established that the size of the alkyl radical in the amino-groups of the diamine has an effect on the properties of the products obtained. Two types of binary mixed polyamides were obtained starting with AG-salt, 4,4'-diamino-3,3'-dimethyldiphenylmethane, its N,N'-diethyl derivative, and adipic acid. The dependence between the melting point of the mixed polyamides and their composition was investigated.

6. Plastic From Furfural and Furfuryl Alcohol

"A Thermosetting Resin From Furfural and Furfuryl Alcohol," by A. Abduvaliyev, N. Kh. Khayrutdinova, A. G. Andreyev, and A. S. Sultanov, Institute of Chemistry, Academy of Sciences Uzbek SSR; Tashkent, Uzbekskiy Khimicheskii Zhurnal, No 4, Sep/Oct 58, pp 53-57

On the basis of the experimental work described, it is concluded that a thermosetting resin can be produced from furfural and furfuryl alcohol combined in quantities corresponding to a molecular ratio of 1:2. The resin is formed under the catalytic effect produced by a 3% admixture of maleic anhydride. The characteristics of the resin obtained make it suitable for application as an insulation varnish. Furfuryl acetal resin is readily compatible with silicone varnish. On being combined with silicone varnish it is suitable as a special adhesive and varnish for applications in the cable industry.

7. V. V. Korshak's Work on Organoelemental Polymers, Synthetic Fibers, and Polycondensation

"V. V. Korshak" (unsigned article); Moscow, Vysokomolekulyarnyye Soyedineniya, Vol 1, No 1, Jan 59 (published in April 1959), pp 164-165

On the occasion of V. V. Korshak's 50th birthday in January 1959, a review is given of the activity of this prominent scientist, who is known because of his research in the field of the synthesis of high-molecular compounds.

Korshak was admitted in 1927 to the Moscow Chemicotechnological Institute imeni Mendeleev. After completion of a course at the institute, he received an aspirantship and worked under the direction of Academician P. P. Shorygin, who at that time began extended investigations in the fields of cellulose chemistry and of the synthesis of high-molecular compounds. After completion of the aspirantship, Korshak remained as an instructor at the Chemicotechnological Institute. At the same time, he continued his research work in the capacity of aspirant and candidate for a doctor's degree at the Institute of Organic Chemistry, Academy of Sciences USSR. After the death of Academician Shorygin, he became leader of a group working on high-molecular compounds at the Institute of Organic Chemistry. In 1941, the degree of a Doctor of Chemical Sciences was conferred on Korshak.

During World War II, Korshak did organizational and party work, combining this work with pedagogical and scientific activities. In 1946, Korshak became head of the Laboratory of High-Molecular Compounds of the Institute of Organic Chemistry, Academy of Sciences USSR. This laboratory was later reorganized into the Division of High-Molecular Compounds of the Institute of Organoelemental Compounds. During the past 10 years, Korshak has been deputy director of the Institute of Organoelemental Compounds.

In 1953, Korshak was elected Corresponding Member of the Academy of Sciences USSR in the special field of the chemistry of high-molecular compounds.

Korshak's scientific activity is highly diversified. His principal investigations are on Friedel-Crafts reactions, polycondensation, and polymerization. During recent years, he has conducted work on the synthesis of organoelemental monomers and polymers.

He has investigated the basic relationships underlying the reactions of linear polycondensation and has synthesized a great number of polymers of different types by applying reactions of this type. Systematic investigation of the dependence of properties of polyesters and polyamides on their chemical structure enabled him to derive important general laws. Technological procedures for the production of such important fiber-forming polymers as

acid and lavesan were developed under his direction. Korshak also conducted investigations with the purpose of clarifying the effect of the structure of monomers on their capability to polymerize either by the radical or the ionic mechanism. He synthesized a number of polymers containing phosphorus, silicon, germanium, boron, and many other inorganic elements. He published more than 200 scientific works, including widely used monographs on the synthesis and investigation of high-molecular compounds, which have been translated into many foreign languages.

Korshak is chief editor of Uspekhi Khimii and a member of various academic and interinstitutional commissions. For a great number of years, he has been professor at the Moscow Chemicotechnological Institute imeni Mendeleev. In his capacity as instructor he trained hundreds of engineers and scores of highly qualified scientists on the Candidate of Sciences and Doctor of Sciences levels. The Soviet government gave recognition to the valuable nature of Korshak's activity by awarding to him three decorations, several medals, and two Stalin prizes in the field of chemical sciences.

8. Some Papers on Glass Presented at Eighth Mendeleev Congress

"The Science of Glass at the Eighth Mendeleev Congress"
(unsigned article); Moscow, Steklo i Keramika, Vol 16,
No 5, May 59, pp 1-4

Thirty papers were presented in the Section of Chemistry and Technology of Glass at the Eighth Mendeleev Congress, held in the second half of March 1959 at Moscow.

A communication by V. V. Vargin and G. O. Karapetyan (State Optical Institute) dealt with the absorption spectra, luminescence, and photochemical properties of glasses containing cerium. The authors of the report established that glasses containing cerium exhibit a considerable resistance toward the effect of ionizing radiation and luminesce under the action of gamma radiation, X rays, and ultraviolet rays.

Measurements of absorption and work on the luminescence of glasses containing cerium established that both trivalent and tetravalent cerium are present in glasses of this type. In borosilicate glasses which have a high content of B_2O_3 or R_2O and in borate glasses all the cerium present is in the tetravalent state. In phosphate glasses the equilibrium is displaced toward trivalent cerium. Generally speaking, an increase in the concentration of basic oxides in the glass contributes to a transfer of the cerium into the tetravalent state.

The investigation that has been carried out contributes to an understanding of the mechanism of the protective effect exerted by cerium in glasses.

Ye. V. Podushko (State Optical Institute) reported on a new method for the electric melting of glass and of silicates by high-frequency currents. By using high-frequency currents, one may reach a temperature in excess of $2,000^{\circ}$, so that extensive possibilities are opened up for the manufacture of high-melting glasses for special purposes. Powerful high-frequency installations for the melting of glass which have been developed and constructed make it possible to change within a few minutes, as required, from an electric to a magnetic field or from a magnetic to an electric field.

K. M. Yevstrop'yev presented a paper on different types of glass. Among new types of oxygen glasses he mentioned aluminum-calcium, antimony, bismuth, nitrate, carbonate, and sulfate glasses; and among oxygen-free glasses, those containing elements of the VI group of the periodic system (S, Se, and Te), i.e., chalcogenide glasses, and also fluoride glasses based on Be F_2 .

The author of the paper noted that there is a correlation between the glass-forming properties of elements and their position in the periodic system. The oxygen-free glasses have a number of special characteristics, including semiconductor properties and the capacity to transmit infrared radiation. These properties make them very useful for certain technical applications.

L. A. Grechanik, N. V. Petrovykh, and V. G. Karpechenko (NIIES, Scientific Research Institute of Electrical Communications) reported on the results of an investigation dealing with oxide semiconductor glasses based on V_2O_5 . It was established in the investigation in question that vanadium glasses are semiconductors with an electrical conductivity which changes depending on the composition of the glass in the range from $10^{-4.3}$ to $10^{-12} \text{ ohm}^{-1} \text{ cm}^{-1}$. Their electrical conductivity is affected considerably by the temperature and varies in conformity with an exponential law. Replacement of V_2O_5 with other oxides results in a lowering of the electric conductivity.

The physicochemical properties of vanadium glasses were investigated. It was found that they exhibit a high thermoelectromotive force, the magnitude of which varies depending on the composition of the glass from plus 500 to minus 200 -volts $\times \text{degrees}^{-1}$. On the basis of the properties exhibited by them, vanadium glasses are suitable as material for thermoresistances.

A communication by N. V. Solomin, L. A. Grechanik, I. V. Shpakova, and Ye. A. Faynberg (Scientific Research Institute of Electrical Communications) dealt with the production of conducting films on glasses which contain easily reducible components. The authors of the paper investigated the physicochemical properties of films which form on bicomponent lead-silicate glasses and on glasses containing Bi_2O_3 , Sb_2O_3 , and As_2O_3 after the glass

has been treated with hydrogen. By using this method, opaque films were obtained which have a specific surface resistance of 10^5 ohms or higher. The films produced in this manner exhibit electrical resistance within an extensive range of potentials, have a weak thermoelectromotive force, and show a negative temperature coefficient which lies in the range of 0.3-1% per 1° .

9. Synthesis and Study of Thiophene Derivatives as Rubber Vulcanization Accelerators and Antioxidants

"The Synthesis of Some Derivatives of Thiophene and the Study of Their Behavior as Rubber Additives (Accelerators and Antioxidants)," by L. G. Angert, Ya. L. Goldfarb, G. I. Gorushkina, A. I. Zenchenko, A. S. Kuz'minskiy, and B. P. Fedorov; Leningrad, Zhurnal Prikladnoy Khimii, Vol 32, No 2, Feb 59, pp 408-418

A description is given of the preparation and testing, for use as additives to rubber mixtures, of 15 compounds of the thiophene series containing an azomethine group and having the general formula $XC_4H_2SCH_2NRY$, where X is hydrogen or CH_3 -, R is either an aliphatic or aromatic radical, Y is a substituent. Azomethines with a benzene ring were also synthesized to compare their behavior as accelerators of vulcanization with analogs in the thiophene series. Besides this, five secondary amines with the composition $C_4H_3SCH_2NHR'X$, where R' is an aromatic radical and X is a substituent, were prepared and tested. Finally, 2-mercapto-4-(2'-thienyl)-thiazole was studied and 2-(2'-thienyl)-pyrimidazole was synthesized.

The authors report, in connection with the synthesis of several azomethines and secondary amines of the thiophene series, that the thiophene compounds containing a secondary amino group or hydroxy group inhibit oxidation of crude rubber. The inhibiting action of these compounds depends, to a considerable degree, on the nature of the ortho- and para-substituents in the benzene ring.

A number of the investigated compounds act as accelerators in the vulcanization of rubber. The most effective among them appeared to be 2-mercapto-4-(2'-thienyl)-thiazole and di-2-thenylidenethylenediamine.

As vulcanization accelerators, the thenylidene group exhibits a more effective influence on the properties of compounds than the benzene ring.

Inorganic Chemistry

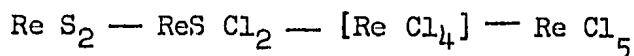
10. Chlorination of Rhenium Disulfide

"Chlorination of Rhenium Disulfide With Gaseous Chlorine,"
by V. G. Tronev, G. A. Bekhtle, and S. V. Davidyants;
Stalinabad, Trudy Akademii Nauk Tadzhikskoy SSR -- Institute
Khimii; Issledovaniya v Oblasti Khimii Redkikh Metallov i
Soley (Transactions of the Academy of Sciences Tadzhik SSR
-- Institute of Chemistry; Investigations in the Field of
Rare Metals and Salts), Vol 84, No 2, Jul 58, pp 105-119

Rhenium occurs chiefly in molybdenum and copper-molybdenum ores. Its content in these ores varies from thousandths to hundredths of 1% (S. M. Basitova, dissertation, Moscow, 1950). To enrich rhenium in connection with the treatment of ores of this type, chemical methods, including chlorination, are applied. The chlorination of rhenium sulfides with gaseous chlorine had not yet been investigated. For this reason, the work reported in this instance was done.

It was established that as a result of the interaction of rhenium disulfide with gaseous chlorine, nonvolatile rhenium sulfochloride is formed, the composition of which is close to ReSCl_2 , and also highly volatile rhenium pentachloride.

When rhenium trichloride is heated in chlorine, it is relatively stable up to 400° . As a result of prolonged action of chlorine on rhenium trichloride at $400-500^\circ$, the trichloride is converted completely into rhenium pentachloride. The conversion of rhenium disulfide into rhenium pentachloride proceeds in the following stages:



Rhenium trichloride was prepared for the first time in the course of the investigation described. Its properties were investigated. It was established that at $400-500^\circ$ rhenium pentachloride becomes a chlorinating reagent which interacts with rhenium sulfide. Rhenium trichloride forms as a final product of the secondary processes resulting from this interaction. When rhenium disulfide is chlorinated, the sulfide ion undergoes complex transformations culminating in the formation of sulfur monochloride. The sulfur monochloride does not participate in secondary processes and volatilizes without change.

On the basis of the work which has been done, one may conclude that as far as the nature of intermediate products formed in the chlorination is concerned, metal sulfides can be divided into two groups, those which form sulfochlorides (the sulfides of rhenium, antimony, bismuth, and some other metals) and those which do not (e.g., Cu_2S and FeS_2). When sulfides of the second group are chlorinated, lower chlorides are first formed. When an excess of chlorine is present, the lower chlorides are transformed into higher chlorides of the metals in question.

"Chlorination of Rhenium Disulfide With a Mixture of Chlorine and Oxygen," by V. G. Tronev, G. A. Bekhtle, and S. V. Davidyants; Stalinabad, Trudy Akademii Nauk Tadzhikskoy SSR -- Institut Khimii; Issledovaniya v Oblasti Khimii Redkikh Metallov i Soley, Vol 84, No 2, Jul 58, pp 121-127

Chlorination of rhenium disulfide with a mixture of chlorine and oxygen leads to the formation of rhenium oxychlorides. With an excess of oxygen (a ratio of the volume of chlorine to that of oxygen = 1:7) the principal product of the reaction is rhenium trioxychloride. When a still greater excess of chlorine is used (a ratio of chlorine to oxygen = 1:1.25), rhenium oxytetrachloride is formed. Employment of a mixture of chlorine and oxygen with a volume ratio of Cl_2 to O_2 = 1:3 results in the formation of approximately 40% of rhenium oxytetrachloride and 60% of rhenium trioxychloride.

As a by-product of the reaction, a highly volatile oxychloride of a violet color is formed. The latter was obtained in a very small quantity; it was not possible to determine its composition.

When rhenium disulfide was chlorinated with a mixture of chlorine and oxygen present in a ratio of volumes = 1:3 and additional oxygen was supplied outside of the reaction zone, the distillate consisted solely of rhenium trioxychloride.

In the chlorination of rhenium disulfide with mixture of chlorine and oxygen, there is originally formation of intermediate products consisting of lower oxides and chlorides of rhenium. These compounds are rapidly converted into low-boiling oxychlorides. In this respect, the conversion with chlorine and oxygen differs considerably from conversion with chlorine alone.

11. Concentration of Rhenium in Form of Volatile Oxychloride

"Investigation of the Behavior of Rhenium in the Process of Chlorination of Molybdenite," by V. G. Tronev, S. M. Basitova, G. A. Bekhtle, and S. V. Davidyants; Stalinabad, Trudy Akademii Nauk Tadzhikskoy SSR -- Institut Khimii; Issledovaniya v Oblasti Khimii Redkikh Metallov i Soley, Vol 84, No 2, 8 Jul 58, pp 129-136

The content of rhenium in molybdenite amounts to 0.01-0.3%. For a number of years, investigations on the chlorination of scheelite and molybdenite were conducted at the Institute of Chemistry, Academy of Sciences

Tadzhik SSR. Because molybdenite is the mineral which is richest in rhenium, an investigation of the behavior of rhenium during the oxidative chlorination of this mineral was of practical interest.

An investigation of the behavior of rhenium during the oxidative chlorination of molybdenite indicated that under optimum conditions of chlorination, the rhenium contained in the molybdenite is distilled off completely in the form of a volatile oxychloride. Two oxychlorides of rhenium are formed, ReO_3Cl (boiling point 131°) and ReOCl_4 (boiling point 223°), as was established by chlorinating oxidatively synthetic Re S_2 . The highly volatile ReO_3Cl readily separates from the main quantity of MoO_2Cl_2 and can be recovered by means of aqueous absorbents, whereas the less volatile ReOCl_4 is retained by the molybdenum oxychloride.

To transfer the total quantity of rhenium into aqueous absorbents, it is necessary to distill all the rhenium in the form of ReO_3Cl . This can be achieved by supplying additional oxygen, which oxydizes ReOCl_4 to $\text{Re O}_3\text{Cl}$. The difference in the boiling points of the oxychlorides of molybdenum and rhenium and the low vapor tension of MoO_2Cl_2 make it possible to separate the oxychloride by fractional distillation. In the initial mixture containing molybdenum, the ratio of rhenium to molybdenum amounts to 1:1250. Conversion by oxidative chlorination makes it possible to obtain a mixture in which the ratio of rhenium to molybdenum amounts to 1:5.

Nuclear Fuels and Reactor Construction Materials

12. Formation of Endogenous Uranium Deposits

"On the Behavior of Radioactive Elements in Processes of the Formation of Endogenous Deposits," by A. G. Betekhtin, Institute of Geology of Mineral Deposits, Petrography, Mineralogy, and Geochemistry (IGEM); Moscow, Geologiya Rudnykh Mestorozhdeniy, No 1, Jan/Feb 59, pp 5-24

This article discusses the principal geochemical characteristics of radioactive elements, primarily uranium, and the behavior of these elements during processes of ore formation. Problems are also considered pertaining to the behavior of radioactive elements in solutions and the formation of minerals from these elements as affected by the redox conditions of the medium in which processes of mineral formation take place. On the basis of the factual material presented, a classification of endogenous uranium deposits is proposed. A classification of exogenous deposits and deposits that have undergone metamorphosis will be proposed in an article published in one of the subsequent issues of the periodical.

13. Prospecting for "Blind" Uranium Deposits

"At the All-Union Conference on the Development of Scientific Principles of 'Blind' Ore Bodies Prospecting," by T. N. Shadlun; Moscow, Geologiya Rudnykh Mestorozhdeniy, No 1, Jan-Feb 59, pp 111-119

At the All-Union Conference on the Development of Scientific Principles of Prospecting for "Blind" Ore Bodies of Endogenous Deposits held 18-24 November 1958 in Moscow, N. N. Sochevanov (All-Union Institute of Prospecting Geophysics) presented a communication on results achieved in the development of methods to be applied in prospecting for "blind" uranium ore bodies.

14. USSR Book on Geology of Uranium To Be Published

Geologiya Urana (Geology of Uranium), by M. N. Konstantinov, Atomizdat, Moscow, 1959, 5 standard printed sheets, price one ruble 50 kopecks, reviewed in Tematicheskoy Plan Izdaniy Atomizdata na 1959 God (Publications Plan of Atomizdat for 1959), Atomizdat, Moscow, 1959, 44 pp (p 25)

Publication of 40,000 copies of this book, said to be of the popular science type, is planned for the fourth quarter of 1959.

15. USSR Book on Prospecting for Uranium

Metody Poiskov, Razvedki, i Oprobovaniya Promyshlennyykh Mestorozhdeniy Urana (Methods of Prospecting for, Surveying, and Assaying of Industrial Occurrences of Uranium), by D. Ya. Surazhskiy, Atomizdat, Moscow, 1959, 25 standard printed sheets, price 14 rubles; reviewed in Tematicheskoy Plan Izdaniy Atomizdata na 1959 God (Publications Plan of Atomizdat for 1959), Atomizdat, Moscow, 1959, 44 pp (p 13)

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"This book is a systematic manual on one of the most important subdivisions of prospecting and surveying geology. It has been compiled on the basis of experience acquired in prospecting for and surveying uranium occurrences in the USSR and outside of the USSR. The first section of the book gives a general characterization of industrially exploitable uranium occurrences and considers the principal criteria used in determining the type of prospecting that is to be used. The second section describes methods of prospecting for uranium occurrences by the radiation, gas prospecting, and salt prospecting methods. The third section covers methods of preliminary prospecting, detailed prospecting, and assaying of ore bodies. The final part of the book deals with basic criteria to be applied in the evaluation

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of uranium occurrences from the standpoint of possibilities of industrial exploitation. It also deals with some special methods of calculating the available supplies of uranium. All data contained in the book are published for the first time.

"The book will be of use to engineers, geologists, technicians-geologists, and students of geological prospecting at higher educational institutions where instruction in mining is given. It can also be of use to mining engineers and technicians who work at uranium mines. The publication of an edition consisting of 10,000 copies is planned for the fourth quarter of 1959."

16. Radiometric Control of Uranium Mining

Metody Geologo-Geofizicheskogo (Radiometricheskogo) Obsluzhivaniya Uranovkh Rudnikov (Methods of the Geologico-Geophysical (Radiometric) Servicing of Uranium Mines), by G. I. Petrov and others, Atomizdat, Moscow, 1959, 12 standard printed sheets, price 6 rubles; reviewed in Tematicheskii Plan Izdaniy Atomizdata na 1959 God (Publications Plan of Atomizdat for 1959), Atomizdat, Moscow, 1959, 44 pp (p 13)

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"Brief information is given on the morphological types of uranium occurrences, radiological properties of uranium ores, the demands put by the industry to uranium ores, and also methods of surveying uranium deposits and exploiting them. Principal attention is paid to fundamental problems which must be studied in connection with the preparation of geologico-geophysical documentation, considering the specific characteristics of uranium deposits, the calculation of losses and estimation of impoverishment of ores, calculation of the movement of supplies, observation of water in the mines, and other types of activity.

"This book has been published for geologists, geophysicists, and hydrogeologists who are starting to work at uranium deposits. It can also be of use to members of technical control divisions at mines and plants who are concerned with the determination of the quality of uranium ore and uranium concentrates being produced.

"Ten thousand copies of the book will be published in the fourth quarter of 1959."

17. USSR Book on Treatment of Uranium Concentrates

Tekhnologiya Pererabotki Kontsentratov Urana (Technology of the Conversion of Uranium Concentrates), by N. P. Galkin, A. A. Mayorov, and U. D. Veryatin, Atomizdat, Moscow, 12 standard printed sheets, price 7 rubles 50 kopecks; reviewed in Tematicheskii Plan Izdaniy Atomizdata na 1959 God (publications Plan of Atomizdat for 1959), Moscow, 1959, 44 pp (p 9)

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"This book gives general information on hydrometallurgical processes for the production of uranium from uranium raw materials, supplies of uranium ores, the volume of production [of uranium], and applications of uranium. Principal attention is paid to the technology of the conversion of uranium concentrates to pure salts and metallic uranium.

"The methods for the production of the most important uranium compounds are described and also some physicochemical properties of these compounds. Technological flow-sheets applied for the production of metallic uranium in different countries are given.

"The book will serve the needs of workers in the uranium industry and at scientific research organizations. It can be used for training specialists at educational institutions. An edition consisting of 10,000 copies will be published in the second quarter of 1959."

18. Book on Conversion of Uranium Ores

Pererabotka Uranovyykh Rud (Conversion of Uranium Ores), by B. V. Nevskiy, Atomizdat, Moscow, 12 standard sheets, price 6 rubles; reviewed in Tematicheskii Plan Izdaniy Atomizdata na 1959 God (Publications Plan of Atomizdat for 1959), Atomizdat, Moscow, 1959, 44 pp (pp 7-8)

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"This book deals with one of the most important problems of nuclear energy, i.e., the extraction of uranium from ores. It considers all questions pertaining to the technology of the conversion of uranium ores: the properties of uranium, its applications, its supplies and production, different processes of the mechanical enrichment of uranium ores, processes of hydrometallurgical treatment, procedures for the conversion of uranium ores of different composition, practical aspects of the conversion of uranium ores (including descriptions of the most typical plants), testing and process control, principal safety measures to be taken in connection with the conversion of uranium ores, etc.

"An extensive bibliography is included. The book can be used as a manual by students at mining, smelting, and metallurgical higher educational institutions and technical schools. It will also be of use to engineers, technicians, foremen, and skilled workers employed in different branches of the uranium industry.

"To the extent to which technological processes, procedures, and equipment used in the conversion of uranium ores can be utilized in connection with the production of other metals, this book will be of considerable interest to a wide circle of students and specialists working in different branches of the industry of rare and nonferrous metals in general.

"The book will be published in the fourth quarter of 1959. The circulation will amount to 10,000 copies."

19. Hydration of Uranyl Nitrate in Organic Solvents

"The Hydration of Uranyl Nitrate in a Number of Ethers and Esters," by V. M. Vdovenko and Ye. A. Smirnova; Leningrad, Radiokhimiya, Vol 1, No 1, Mar 59, pp 36-42

The degrees of hydration (h) of uranyl nitrate in a number of ethers and esters were determined. It was established that in the homologous series investigated, h becomes smaller on transition from a lower member of the series to a higher.

20. Announcement of Publication of Book on Thorium

Foriy (Thorium), by G. Ye. Kaplan, T. A. Uspenskaya, and Yu. I. Zarembo, Atomizdat, Moscow, 10 standard printed sheets, price 5 rubles; reviewed in Tematicheskii Plan Izdaniy Atomizdata na 1959 God (Publications Plan of Atomizdat for 1959), Moscow, 1959, 44 pp (pp 9-10)

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"This book deals with the principal aspects of the geochemistry and mineralogy of thorium and also with the present status and trends as far as the development of a raw-material basis for thorium outside of the USSR is concerned. Data on the physicochemical properties, corrosion characteristics, radioactivity, and applications of thorium are given, together with brief information on the analytical chemistry of this element. Processes for the production of chemical compounds of thorium, pure metallic thorium, and the most important alloys of thorium are described.

"The book is recommended for scientists, engineers, and technicians. It can also be of use to students at chemical and metallurgical higher technical educational institutions.

"Ten thousand copies of the book will be published in the third quarter of 1959."

21. Separation of Rare-Earth Elements From Phosphorites Converted by Nitric Acid Method

"Rare-Earth Elements in the Nitric Acid Conversion of Phosphorites," by U. Ibragimova and Academician M. N. Nabiyeu, Institute of Chemistry, Academy of Sciences Uzbek SSR; Tashkent, Uzbekskiy Khimicheskiy Zhurnal, No 4, Sep/Oct 58, pp 9-14

To extract rare-earth elements from minerals, different methods of decomposition are applied, depending on the composition of the mineral. Thus, silicates and fluorocarbonates are decomposed with hydrochloric, nitric, or sulfuric acid. In cases when the minerals contain a large quantity of calcium and a small quantity of fluorine, decomposition with hydrochloric acid is adequate. If a large quantity of fluorine is contained in the mineral and the amount of calcium is small, sulfuric acid is better suited for the decomposition.

It is difficult to carry out complete decomposition with hydrochloric, sulfuric, or nitric acid if zirconium, titanium, tantalum, or niobium are present in the minerals.

The question as to what metal is best suited for the extraction of the rare-earth elements from a mineral depends on the nature of the mineral and the presence of other elements. If the mineral contains titanium, niobium, and tantalum, some investigators prefer to apply chlorination at a high temperature (e.g., in the conversion of loparite concentrate). After the volatile chlorides have been eliminated, fused nonvolatile chlorides of the rare-earth metals remain, which are subjected to further conversion.

According to G. A. Aleksandrov and Ya. N. Gokhshteyn, decomposition with sulfuric acid is applied for the treatment of monazite and "lovchorrit" ["lovchorrit" is a mineral the composition of which corresponds closely to that expressed by the formula

$[\text{Ca, Na}]_6 [\text{Ti Ce}]_3 \text{Si}_4 \text{O}_{16} [\text{F, OH}]_4$; it contains Zr O_2 , $\text{Al}_2 \text{O}_3$, Th O_2 , and other oxides].

After decomposition with sulfuric acid, separation of the rare-earth elements and thorium is accomplished with magnesium bisulfite.

Application of magnesium bisulfite as a precipitant of rare earths from solutions makes it possible to produce concentrates of these elements. In the treatment of monazite, elimination of phosphoric acid from the solution is of particular importance.

To obtain rare earths which are not contaminated with phosphoric acid, one separates them from solutions obtained by the chlorination of monazite.

Rare-earth elements are contained in apatites in a larger quantity (0.9-5%) than in phosphorites (0.05-0.8%), which may also serve as raw material for the production of these elements. Conversion of apatite to produce phosphoric acid, fertilizers, and salts is effected by acid decomposition or thermal treatment. Decomposition of apatite with sulfuric acid has been introduced most widely into industrial application. However, this method is not satisfactory, because a considerable portion of the rare earth compounds remains undecomposed in the form of the so-called phosphoric gypsum. Only 20-30% of the rare earths go into solution when decomposition with sulfuric acid is applied. The degree to which the rare-earth elements go into solution depends on the quantity and concentration of the acid and also on the temperature and duration of the reaction. S. I. Vol'fkovich and A. I. Loginova studied the separation of rare-earth elements from the sulfuric acid extract. As far as separation of the rare-earth elements from phosphoric gypsum is concerned, the best procedure has been proposed by I. Zaozerskiy. According to Zaozerskiy, conversion of the phosphoric gypsum by a solution of ammonium carbonate or by treatment with gaseous carbon dioxide and ammonia results in the separation of the rare-earth elements. In this type of treatment, ammonium sulfate is produced. The rare earths are precipitated together with the carbonate, from which they can be extracted with nitric acid under formation of calcium nitrate.

The rare-earth elements contained in apatite can be separated and recovered very completely when apatite is decomposed with nitric acid. S. I. Vol'fkovich, A. I. Loginova, and A. Polyak and also Volkov established that 98% of the rare-earth elements contained in apatite go into solution when the apatite is decomposed with nitric acid. I. D. Borneman-Starinkevich proposed that the rare-earth elements extracted from apatite be precipitated with oxalic acid. Another method of separating the rare earths is partial neutralization with ammonia. N. N. Mironov and A. I. Odnosevtsev proposed that fractional precipitation with ammonia be applied for the separation of rare-earth elements from the sludge of the first neutralization in the production of phosphates. Treatment of this sludge with alkali as a necessary step for the separation of rare-earth elements makes it possible to produce an additional quantity of phosphates and also of fluorides. The method in question has been found suitable for the separation of rare-earth compounds from material containing only a small quantity of these earths.

Experimental work has been completed in Poland on a technological process for the extraction of rare-earth elements from Khibinsk apatite concentrate. V. Mazgaj and N. Kwicin developed a procedure for the decomposition of the apatite concentrate with 49% nitric acid followed by precipitation of P_2O_5 from the solution with a suspension of finely ground limestone. Using Na_2CO_3 or $NaNO_3$, H_2SiF_6 is first precipitated from the solution in the form of

Na_2SiF_6 . The sodium fluorosilicate is converted into Na F . In their report on the process described, Mazgaj and Kwiczin discuss the separation of rare earths in the form of phosphates. According to their data, the recovery of rare-earth elements in this manner amounts to 70-75% of the total quantity introduced with apatite.

At present the technology of elements of the cerium subgroup can be regarded as almost completely worked out. Technological procedures for the separation of elements of the yttrium subgroup have not progressed to an equal extent as yet.

The purpose of the work done in this instance was clarification of the effects exerted by rare-earth elements present in fertilizers and determination of the optimum condition for the separation of these elements in connection with the conversion of Karatau phosphorites by the nitric acid method. It was established that the degree of extraction of rare-earth elements in connection with the decomposition of the phosphorites comprises 80% on the average and for all practical purposes does not depend on the concentration of nitric acid. Reduction of the quantity of nitric acid by 10% below the stoichiometrically required amount lowers sharply the degree of extraction of the rare-earth elements. This circumstance can be utilized for practical purposes. The degree of extraction was lower than that found by A. I. Loginova (98%), because the composition and properties of the crude phosphorite converted in this instance were different.

Organic Chemistry

22. Investigations in Free Radicals

"Investigations in the Field of the Chemistry of Free Radicals of the Hydrazine Series. I. Several Derivatives of alpha, alpha-diphenyl-beta-picrylhydrazyl," by P. O. Matevosyan, I. Ya. Postovskiy, and A. K. Churkov, Ural Polytechnic Institute imeni S. M. Kirov; Moscow, Zhurnal Obshchey Khimii, Vol 29, No 3, Mar 59, pp 858-864

Several radicals of the hydrazine series were synthesized, namely: alpha, alpha-diphenyl-beta-picrylhydrazyl (I) and its fluoro- (II), chloro- (III), and bromo- (IV)--derivatives. Compounds (II) and (III) were prepared for the first time.

On studying the exchange interactions of the unpaired electron by means of paramagnetic resonance, it was established that the strongest exchange interaction is shown by the unsubstituted hydrazyl (I) and the weakest by the fluoro-derivative (II). The last-mentioned result indicates a significantly greater localization of the unpaired electron in this radical in comparison with the unsubstituted radical.

23. Alkaloids of Haplophyllum foliosum Vved. Investigated

"The Alkaloids of Haplophyllum foliosum Vved. On the Structure of Dubinidine," by G. P. Sidiyakin, M. Yeskairov, and S. Yu. Yunusov, UzSSR, Fanlar Akad. dokladi, Dokl. AN UzSSR, 1958, No 8, 27-29 (from Referativnyy Zhurnal -- Khimiya, No 5, 10 Mar 59, Abstract No 15538, by L. Aksanova)

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"From the aboveground portion of H. foliosum Vved., dubinidine (I) was isolated; formula $C_{14}H_{12}ON(OCH_3)(OH)_2$, melting point $132-133^{\circ}C$, [α] $26.5_D - 62.95^{\circ}$ (the derivatives of I and their melting points in $^{\circ}C$ are listed): hydrochloride, 195-196; hydrocromide, 197-198; hydroiodide 161-162; nitrate, 176-177; and picrate, 155-156. Heating I with CH_3I yields iodo-methylate of I, which on heating with 40% KOH in CH_3OH yields the isocompound (II), melting point $214-215^{\circ}$; the hydrochloride of II, melting point $222-223^{\circ}$ (decomposes). II has a NCH_3 -group and does not contain an OCH_3 -group. A similar isomerization was observed earlier (cf. Referativnyy Zhurnal -- Khimiya, 1957, 7458) in the case of 2-phenyl-4-methoxyquinoline. Oxidation

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of I with KMnO_4 leads to the aldehyde $\text{C}_{11}\text{H}_9\text{O}_3\text{H}$, which is converted into the acid $\text{C}_{11}\text{H}_9\text{O}_4\text{H}$ (III), melting point $260-262^\circ$ (decomposes); the methyl ester (ME) of III (with CH_2N_2), melting point $185-186^\circ$; on boiling with 15% HCl , III is decarboxylated and demethylated to $\text{C}_9\text{H}_5\text{ON}(\text{OH})$ (IV), melting point $353-355^\circ$. The ME, acetyl and nitrosoderivatives of IV were prepared. The oxidation of III with KMnO_4 in a basic medium leads to anthranilic acid. On the oxidation of III in a neutral medium with KMnO_4 , the acid $\text{C}_{10}\text{H}_9\text{O}_5\text{N}$ is obtained, its ME (with CH_2N_2) was identified as the dimethyl ester of N-malonylanthranilic acid. Consequently, IV is 4-hydroxyquinolone-2, and III 4-methoxyquinolone-2-carboxylic-3 acid. The authors suggest that I contains a quinoline ring with a CH_3O group in the gamma-position to which is attached a $\text{C}_4\text{H}_{10}\text{O}_2$ residue in position 2 or 3 which contain 2 OH groups.

24. Reactions of Alkylalkoxysilanes With Phosphoric Anhydride

"The Reactions of the Interaction of Alkylalkoxysilanes With Phosphoric Anhydride," by A. P. Kreshkov and D. A. Karateyev; Leningrad, Zhurnal Prikladnoy Khimii, Vol 32, No 2, Feb 59, pp 369-373

A silicon and phosphorus-containing substance with the composition $\text{Si}(\text{PO}_3)_4 \cdot 2\text{H}_2\text{O}$, which possesses a crystalline structure, was separated from the products of the reaction of dimethyldiethoxysilane with phosphoric anhydride, and likewise with phosphorus oxychloride.

The authors established that on the reaction of phosphoric anhydride and dimethyl di-n-butoxysilane, a compound is formed which has the composition $(\text{Si}_3\text{P}_2\text{O}_8(\text{CH}_3)_6)_n$ or $\{[(\text{CH}_3)_2\text{Si}]_3 (\text{PO}_4)_2\}_4$ where n is equal to 7 or 8.

A new method was developed for preparing tris-(trimethyl-silyl)-phosphate, based on the reaction of trimethylmethoxy-, trimethylethoxy- or trimethyl-n-butoxysilane with phosphoric anhydride.

25. Organophosphorus Research at Moscow State University

"Research on the Chemistry of Fertilizers and Insectofungicides," S. I. Vol'fkovich and V. K. Kuskov, Vestn. Mosk. In-ta. Ser. Matem., Mekhan., Astron., Fiz., Khimii, 1957, No 6, 125-136 (from Referativnyy Zhurnal-Khimiya, No 5, 10 Mar 59, Abstract No 16635, by I. Mil'shteyn)

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"By using a method described earlier (L. Z. Soborovskiy, Yu. M. Zinov'iyev, and M. A. Englina, Doklady Akademii Nauk SSSR, 1949, 67, 293; 1950, 73, 333) heptyloxochlorophosphine was prepared from which the ethyl esters of heptylphosphinic and heptylpyrophosphinic acids were obtained by the Tey method (A. D. F. Tey, J. Amer. Chem. Soc., 1948, 70, 3882). When the esters of boric acid were phosphorylated by PCl_3 in the presence of oxygen and subsequently hydrolyzed, hydroxyphosphinic acids were obtained, in which the position of the hydroxy group was not established. When triethylthiophosphate (I) is reacted with p-nitrophenol (II) at 190-200°C, a mixture of esters is obtained which is equivalent to thiophos in insecticidal activity. The reactions between I and "captax" and between trimethylthiophosphate and II proceeds analogously. A review is given of the other investigations on fertilizers and insectofungicides at the Chair of Chemical Technology of Moscow State University."

26. New Plasticizer Synthesized

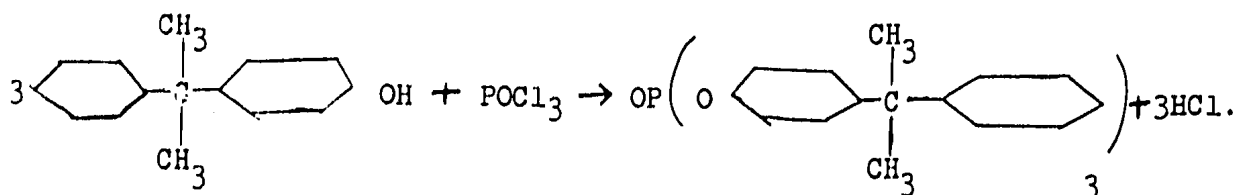
"On the Synthesis of Tridimethylphenyl-p-cresylphosphate," by Ye. V. Kuznetsov and L. Minimullina, Laboratory of the Chair of Organic Synthesis Technology of the Kazan Chemicotechnological Institute, Leningrad, Zhurnal Prikladnoy Khimii, Vol 32, No 2, Feb 59, pp 464-5

Phenyl esters of phosphoric and phosphorous acids and their various substitutions products have long been known and widely used in industry as plasticizers, antioxidants, insectofungicides, etc. Triphenylphosphate, tricresylphosphate, trichlorophenylphosphate, trinitrophenylphosphate, and other compounds belong to this group.

The synthesis and properties of the polyphenyl derivatives of phosphorus acids have not been described in the literature, according to the author. Hence they considered investigation of the synthesis of dimethylphenyl-p-cresylphosphate both of theoretical and practical importance.

They established that this synthesis proceeds readily, differing only slightly from the synthesis of tricresylphosphate.

The synthesis of tridimethylphenyl-p-cresylphosphate can be represented by the following reaction:



Magnesium chloride proved to be an excellent catalyst of this reaction. The synthesis takes place at a rather high temperature, around 120-170° C. Its high boiling point and compatibility with a number of high-polymers make this product, tridimethylphenyl-p-cresylphosphate, a promising chemical for industrial use. A 90%-yield was obtained. The boiling point is 390-400° at 0.1 mm without decomposition; the melting point 142°. The substance is not soluble in ether but is readily soluble in tricresylphosphate, triphenylphosphate, benzene, butyl acetate, and acetone. It plasticizes polyvinyl-chloride, nitrocellulose, and other plastics, imparting to them the property of extinguishing spontaneously combustion after being ignited.

27. Preparation of Emulsion Concentrates of Organophosphorus Insecticides

"A Method for Preparing Emulsion Concentrates of Organophosphorus Insecticides," by S. F. Bezuglyy, Ya. A. Mandel'baum, V. N. Volkov, and N. N. Mel'nikov; Moscow, Byulleten' Izobreteniy, No 7, Apr 59, p 52, Patent No 119038

A method has been developed for producing emulsified concentrates of organophosphorus insecticides by blending the active agent, a surface-active substance, and a solvent. This method is characterized by the use of green oil [a petroleum product], which readily emulsifies, or a mixture of green oil with other known solvents. A saving of the emulsifiers OP-7, OP-4, and OP-10, which are in short supply, is achieved thereby.

Radiation Chemistry

23. Possibilities of Application of Radiation-Chemical Processes in Chemical Industry

"Prospects of the Application of Radiation-Chemical Processes in the Chemical Industry," by M. A. Proskurnin; Moscow, Khimicheskaya Promyshlennost', No 2, Mar 59, pp 99-106.

The general aspects of radiation-chemical reactions, radiation-chemical reactions in pure substances, radiation-chemical reactions in complex systems consisting of more than one substance, and practical aspects of radiation-chemical reactions from the standpoint of their application on an industrial scale are reviewed on the basis of USSR and non-USSR work. Data concerning the author's own investigations in this field are included. A bibliography consisting of 23 USSR references and 7 non-USSR references is appended to the article.

The author brings out that products capable of giving rise to further transformations and of reacting energetically (free radicals and free atoms) originate under the effect of penetrating radiation at any temperature. These radicals and reactive free atoms can be preserved for a long time at sufficiently low temperatures. The production and preservation by freezing of free radicals which form as a result of the irradiation of different substances is said to be of interest from the standpoint of scientific research and possibly also from that of increasing the chemical reactivity of fuels. It is stated that radicals which have an intermediate degree of stability will presumably be applied in chemical technology, dyeing, initiation of chain reactions (i.e., replacing peroxides as far as this application is concerned), bleaching, etc. According to a statement made by the author, the production of free radicals was so difficult until recently that no prospects of their application on an extensive scale existed. However, radiation-chemical processes enable the production of a number of substances (including free radicals) with a degree of facility which makes it necessary to revise the views prevalent hitherto on the inaccessibility of some compounds; attempts can now be made to apply these compounds in chemistry.

As far as applications of radiation chemistry in petroleum conversion are concerned, it is stated that dehydrogenating condensation to produce heavier fractions and cracking (at elevated temperatures) can be carried out to advantage with the aid of radiation. Although few reliable data on the uses of radiation in petroleum chemistry are available, there can be no doubt, in the author's opinion, that the prospects of this type of application are good.

The radiation-chemical oxidation of nitrogen is discussed on the basis of USSR and non-USSR work. It is said that the kinetics of the processes involved are being studied by S. Ya. Pshezhetskiy and coworkers in the USSR. The process for the oxidation of benzene to phenol investigated by J. Weiss (England), which is conducted at a low temperature and yields 2 molecules of phenol per 100 electron-volts, is compared with a process investigated by the author, which is carried out at an elevated temperature (160-220°) and yields hundreds of molecules of phenol per 100 electronvolts. Recent work by V. D. Orekhov and L. I. Velen'kiy on the radiation chemical method of dyeing of textiles (the leuco-base of the dyestuff is oxidized on the fiber under the action of radiation) is described. This work had not yet been published at the time when Proskurnin's article was written, but was scheduled for publication in Zhurnal Obshchey Khimii.

It is reported on the basis of results obtained by N. M. Emanuel' and Proskurnin that paraffins can be oxidized to fatty acids without the use of catalysts if radiation is applied.

It is stated that by applying radiation, one may catalyze some processes at the boundary between liquids and solids, where the reaction takes place with higher yields than in the volume of the solution. To illustrate reactions of this type, K. A. Kocheshkov's work on the chain reaction of the formation of $\text{Sn R}_2 \text{ Br}_2$ at the boundary between tin and alkyl/bromides (R Br) under the action of gamma radiation is mentioned. The industrial aspects, costs, possible designs of equipment, sources of radiation, etc. are discussed from the standpoint of the possibilities of carrying out the following reactions on an industrial scale: polymerization of ethylene in the gas phase under different conditions, polymerization of ethylene in organic solvents, emulsion polymerization of styrene, polymerization of styrene in a concentrated state, vulcanization of tire casings, cross-linking of polyethylene, oxidation of benzene according to Weiss, chain oxidation of benzene at 190° and an oxygen pressure of 10 atmospheres, oxidation of ethylene to acetaldehyde, oxidation of nitrogen to NO_2 or HNO_3 , decomposition of carbon dioxide to form carbon monoxide, and typical reactions of organic synthesis.

In the section on radiation-chemical reactions in pure substances it is pointed out that hexafluoropropylene can be polymerized only by the radiation method; ordinary methods are not effective. With reference to the radiation-chemical vulcanization of rubber, it is said that this method should be applied in rubber production notwithstanding the availability of other methods of vulcanization, because the quality of the rubber is greatly improved by its application.

29. Forthcoming Publication of Book on Radiation Chemistry

Radiatsionnaya Khimiya (Radiation Chemistry), by I. V. Vereshchinskiy and T. S. Nikitina, Atomizdat, Moscow, 1959, 5 standard printed sheets, price one ruble 50 kopecks; reviewed in Tematicheskii Plan Izdaniy Atomizdata na 1959 God (Publications Plan of Atomizdat for 1959), Atomizdat, Moscow, 1959, 44 pp (p 25)

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"This book discusses practical application of ionizing radiation means of carrying out important chemotechnological processes, specifically those involved in the production of plastics and of other synthetic materials with novel characteristics. A popular treatment is given to the new branch of science, i.e., radiation chemistry, which originated during the past decades and is concerned with the action of radiation on chemical reactions. The book is destined for wide circles of the educated USSR public and also for students at higher educational institutions and technical schools who are interested in applications of nuclear energy in chemistry."

Miscellaneous

30. New Petrochemical Institute Established in Azerbaydzhan

"This Will Speed Up the Development of the Chemical Industry," by P. Arushanov and M. Mamedov, engineers; Baku, Bakinskiy Rabochii, 7 Jan 59, 1 Feb 59

The Institute of Petrochemical Processes (Institut Neftekhimicheskikh Protssessov), Academy of Sciences Azerbaydzhan SSR, was recently established in Sumgait, Azerbaydzhan SSR. The new institute was established on the basis of the Azerbaydzhan Scientific Research Institute of Petroleum Refining; the Institute of Petroleum, Academy of Sciences Azerbaydzhan SSR; and a number of laboratories of the Institute of Chemistry, Academy of Sciences Azerbaydzhan SSR. It has 26 laboratories which are scheduled to work on 13 major problems comprising 40 themes. The principal research efforts will concern the development of the process of obtaining monomers from gas and petroleum raw resources and on that basis the development of various polymer materials, and the methods for improving processes of refining petroleum to obtain motor oils, lubricants, and fuels. M. F. Nagiyev, Vice-President, Academy of Sciences Azerbaydzhan SSR, is the director of the new institute.

II. ELECTRONICS

Communications

31. Radio Relay Lines

"Radio-Relay Trunk Lines," by I. S. Ravich; Moscow, Radio,
No 5, May 59, p 10

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The article contains the following passages: "In the very near future, substantial impetus will be imparted to the construction program for radio-relay and coaxial cable lines between our brotherly nations. Construction of coaxial trunk lines between Moscow, Prague, Berlin, and Warsaw will be completed during the years 1960-1962. Simultaneously, radio-relay lines to Bucharest and Sofia, as well as Budapest and Prague, will be put into operation. All of these international lines will be provided with Soviet equipment. On completion of this program, a regular mutual exchange of television programs between the TV centers of the socialist nations of Europe and the USSR will be established."

32. Television Receiver "Rubin-102"

"Rubin-102," by V. Khakharev; Moscow, Radio, May 59,
pp 25-30

The "Rubin-102" is a high-grade table model television receiver which incorporates the latest developments of television technique. It can receive TV programs of all of the 12 channels, as well as FM-VHF radio programs in the frequency range of 64.5-73 Mc.

The set incorporates 19 tubes and 9 semiconductor diodes. The screen of the picture tube (43LK3B) is 270 x 360 mm. The high-frequency end of the receiver is built on the superheterodyne principle, utilizing standard intermediate frequency (34.25 MC for video channel and 27.75 Mc for audio channel). The sensitivity of the set is not less than 100 microvolts, and selectivity for the adjacent channel is not less than 26 db. Vertical resolution is 500-450 lines, and horizontal resolution is 550-500 lines (the first value stands for the center of the screen and the second for the edge). The over-all size of the set is 495 x 480 x 435 mm, and it weighs 35.5 kg.

33. Scatter Propagation

"Theory of Diversity Reception in Long-Range VHF Tropospheric Propagation," by A. V. Prosin and V. F. Gubskiy; Moscow, Radiotekhnika, No 5, May 59, pp 23-33

Fast and strong fading of VHF signals, due to the interference of random amplitude and phase of the radio beams, is often observed in long-range tropospheric scatter propagation. Various methods of diversity reception are practiced to compensate for this sudden fading. Greatest gain in diversity reception is obtained when the received signals are independent.

In designing communication systems for long-range VHF tropospheric scatter propagation, it is necessary to know the extent of the diversity, which is determined on the basis of correlation functions for frequency and space diversity of signals.

The purpose of this work is to investigate the correlation functions for frequency and space diversity of signal with full consideration for actual directivity of antennas. As a result of this investigation, the dependence of correlation functions on the individual effect of the antenna directivity in two orthogonal planes, on the orientation of the antenna axis with respect to the horizon, on the height of the antenna suspension, and on the characteristic of anisotropy of the turbulent atmosphere are established.

Formulas and graphs for the correlation functions are obtained which permit calculating the extent of diversity most suitable for a scatter propagation communication system.

34. Probability Calculus Applied for Determination of Toll-Dialing Efficiency

"Traffic Efficiency and Traffic Remnants of Perfect Groups in Instantaneous Traffic, With the Number of Sources Taken Into Account," by F. K. Stell, Institute for Postal and Telecommunications, Berlin; Berlin, Nachrichtentechnik, No 5, May 59, pp 215-234

The parameters heretofore used for the designing of automatic instantaneous exchanges, i.e., the loss curves of Langer (Fernsprechtechnik, [Telephone Engineering], Vol III, Berlin 1951) and the loss tables of the former Deutsche Reichspost, are considered unsatisfactory for the requirements of modern toll dialing, since the definition of the concept of traffic, or operational, efficiency as the portion of successful calls in relation to unsuccessful calls is feasible only in the case of small losses and fails as soon as the number of calls desired by subscribers is limited, and, at the same time, subscribers force through their calls by repeated attempts to dial the desired number. For the same reason, no agreement can be reached between the measured and computed (especially with the Erlang equation)

values in the case of reduced traffic efficiency. The principal problems of traffic efficiency are the same for both local and long-distance dialing. Rural dialing presents an important additional problem, namely, the exact determination of traffic remnants in the case of overflow traffic over tie-line networks, for which previous data cannot be used.

This article presents a detailed theoretical analysis of the relationships for perfect groups, expressing these relationships by means of probability calculus, taking into account the number of sources. It is further shown that, particularly in the designing of groups for rural dialing, the number of sources cannot be neglected, as is done when the Erlang equation is used. A new formulation is suggested for the concept of traffic efficiency.

The results of the investigation are presented in graphic form and compared with the results of practical measurements. A critical comparison is made between the parameters used and results obtained in this investigation and the comparable values used by the former Reichspost and the new values of the [West German] Bundespost.

Components

35. Excitation Control Equipment with Semiconductor Elements

"Circuits With Semiconductor Components for Automatic Control of Electric Machine Excitation," by Ye. M. Bron and R. A. Firdman; Novochoerkassk, Izvestiya Vysshikh Uchebnykh Zavedeniy, Elektromekhanika, No 1, Jan 59, pp 71-87

The article describes a device for automatic control of synchronous generator excitation, covered by patent No 599678/24 of Ye. M. Bron, G. V. Il'menkov, L. Z. Madorskiy, and R. A. Fridman. To effect the response of forced excitation, the device utilizes a combination of a comparison circuit having linear and nonlinear elements with a transistorized preamplifier circuit which becomes nonconducting a certain voltage drop, thus removing magnetization from the phase-compounding transformer. When the voltage at the generator bus bar increases, the voltage of the nonlinear element exceeds that of the linear elements so that the transistor base acquires a negative potential, resulting in a current increase through the transistor, as well as through the control winding of the transformer.

The article describes also the construction and performance of another automatic excitation regulator developed at the Leningrad Affiliate of the Scientific Research Institute of the Electrical Industry.

36. High-Stability "Clapper" Type Oscillator

"High-Stability 'Clapper' Type Oscillator for Frequency Responding Systems of Remote Control," by F. A. Kotov, Chair of Automation and Telemechanics, Kiev Polytechnic Institute; Kiev, izvestiya Vysshikh Uchebnykh Zavedeniy, Radiotekhnika, No 6, Nov/Dec 58, pp 665-668

The frequency stability of oscillators used in frequency responding systems of remote control should be high. The stability of such oscillators should be greater than the operating band-width of the actuating relays. Thus, in case of a narrow-band frequency relay with relative band-pass sensitivity of 1.5 to 2%, the frequency stability of the oscillators should be at least $\pm 0.2\%$.

At the Chair of Automation and Telemechanics of the Kiev Polytechnic Institute, a "clapper" (reed) type oscillator was developed which possesses the desired frequency stability. Such a "clapper" oscillator consists of two basic elements: a clapper (reed) vibrator and a transistor. The base bias of the transistor is attained with the help of a voltage divider, consisting of a resistor and the ohmic resistance of the winding.

The stability test showed that, when the load varied up to three times its original value and the supply voltage fluctuated $\pm 20\%$, the oscillator frequency would deviate less than $\pm 0.05\%$. The frequency deviation due to temperature changes was of the order of 0.002% per 1°C. The thermo-compensating alloy EI-25 was used to make the clapper of the oscillator.

One of the features of the newly developed "clapper" oscillator is that it can be easily switched from operation as an oscillator to operation as a frequency relay.

37. Transistorized Radio Receivers

"What Are the Designers Doing?" by B. Semenov; Moscow, Radio, No 5, May 59, pp 8-9

CPYRGHT The article contains the following passages:

"During the past few years, Soviet industry has achieved a considerable success in the field of production of semiconductor devices. Semiconductor devices operating in the frequency range up to 100 Mc are now being produced in large lots, while those operating in the frequency range up to 500 Mc are produced only in experimental lots.

"Several radio manufacturing plants in the USSR have already started or are completing preparations for series production of two-band transistorized radio receivers, such as the table model 'Voskhod' for rural locations, the portable set 'Progress,' the pocket version 'Syurpriz,' and the combination radio receiver 'Rodina-59.'

"Many of the mentioned receivers were developed at the Scientific Research Institute of Radio Broadcasting (Reception) and Acoustics (IRPA).

"A collective at our institute has also developed a low-power broadcasting station intended for use in the Far North regions, for geological expeditions, etc. This station is almost ready for production on mass scale at one of the plants of the Leningrad sovnarkhoz.

"During the next few years, in many parts of the USSR there will be operating VHF broadcasting stations.

"Work is now being conducted on design of a new VHF receiver at our institute. In an effort to utilize more effectively the small dimensions of semiconductor devices, the receiver proper (which will be rated as first class) is designed in the form of an individual unit mounted in a case the size of a book. The second unit, comprising two-channel audio amplifier, rectifier, and high-fidelity acoustic system are housed in a box, which can be placed on the floor."

Computers and Automation

38. Optimal Parameters of Control Systems With Overshoot

"An Integral Criterion for the Choice of Optimal Parameters of Automatic Control Systems With Given Overshoot," by A. I. Tupitsyn, Khar'kov; Moscow, Avtomatika i Telemekhanika, No 4, Apr 59, pp 406-414

A theoretical treatment shows that the integral criterion introduced here can indicate the optimal parameters of a system of automatic control with any given (within wide limits) value of overshoot.

In the examples of the use of two criteria for determining the optimal parameters of linear stationary control systems, there is good agreement between results of a calculation of the optimal parameters of relay systems and the results of an examination of the theoretical extremals, with respect to both overshoot values and control times.

The investigated criteria also apply to problems of statistical dynamics.

39. Exponential Converters in Telecontrol Systems

"Design Principles of Contactless Systems of Telecontrol With Exponential Converters," by V. A. Il'in, Moscow; Moscow, Avtomatika i Telemekhanika, No 4, Apr 59, pp 468-472

Exponential converters afford the possibility of building, without the use of ferromagnetic core elements, simple but highly reliable contactless telecontrol and telesignaling systems with time separation of the signals. In contrast to other systems with time or code separation of signals, the design of a transmitter with exponential converters can be greatly simplified by a reduction of the number of commands transmitted per cycle. In the systems under consideration, the distributor of the receiver may, for the reception of one command, have a simplified exponential converter with two diodes and one coincidence stage. This considerably simplifies the receiver design and opens a wide area of use for exponential converters in telemechanical systems involving widely separated objects. Telemechanical frequency systems with similar properties have a wide area of use in the telemechanization of disperse units.

In exponential converters, the duration of pulses and the period of signals can be from tens of microseconds to tens of seconds. For high-speed systems, this affords the possibility of variation within wide limits and facilitates the matching of a system to actual communications channels.

This article discusses design principles for a proposed new system of telecontrol and telesignalling with time separation of signals. Formulas are given for the determination of the chief parameters of such systems.

40. Parameters of Autopilot With Rate Feedback

"The Use of a Square Integral Estimate for Determining the Optimal Parameters of an Autopilot With Rate Feedback," by V. D. Matytsin and V. A. Ryapolov, Moscow; Moscow, Avtomatika i Telemekhanika, No 4, Apr 59, pp 415-421

An investigation is made of the stabilization of an aircraft by means of an autopilot with rate feedback. Analytical formulas are given for an approximate determination of the optimal values of the transmission quantities of the autopilot in relation to the aerodynamic characteristics of the controlled vehicle and the flight conditions, with the inertia of the controller taken into account. The minimum square integral estimate is used as a criterion of an optimal stabilization process.

The expressions introduced can serve as a good approximation for the final choice of transfer numbers to simulators, when a full system of equations describing the motions of an aircraft is taken into account.

The article represents a report delivered at the seminar on automatic control at the Institute of Automatics and Telemechanics in 1958.

41. Vibration Circuit of an Autopilot Servo

"The Dynamics of the Vibration Circuit of an Electrical Servomechanism Under Conditions of Free Oscillation," by I. N. Krutova, Moscow; Moscow, Avtomatika i Telemekhanika, No 4, Apr 59, pp 422-436

The circuit considered here is a vibration circuit of the servo of an electrical autopilot. The circuit contains two parallel control channels with common feedback. The motion of the circuit is described by three first order equations. The dynamics of the circuit is investigated by means of a phase space and point transformations. Branched relationships are obtained, which indicate the limits of existence of various types of motion in the scope of the circuit parameters.

42. Automation Conference Held in Moscow

"All Union Conference on Automation," (unsigned article); Moscow, Izvestiya, 13 May 59, p 1

On 12 May 1959, the Third All-Union Conference, devoted to the automation of production processes in machine building and automatic electronic drive in industry, opened in the Hall of Scientists, Moscow. More than 800 specialists from various regions of the country attended. The conference was sponsored by the Academy of Sciences, USSR; State Planning Commission, USSR; State Scientific-Technical Committee of the Council of Ministers USSR; State Committee of the Council of Ministers of Automation and Machine Building; and the National Committee of the USSR on Automatic Control. During the opening session, Academician, V. I. Dikushin presented a paper entitled "Problems of the Development of Automation in Machine Building," and Doctor of Technical Sciences M. G. Chilikin presented a paper on the contemporary problems of automation of electric drive. During the first session, papers were also presented by Academician N. G. Bruyevich and Academician S. G. Strumilin on the reliability and accuracy of the automation of manufacturing and the economics of automation in machine building, respectively.

The conference was in session 5 days.

43. Automation of Tractors

"Experiment of Tractors With Automatic Control," P. Bogatenkov, Pravda; Correspondent Moscow, Pravda, 25 May 59, p 2

I. G. Loginov, Cossack mechanic, together with engineers, has performed experiments in the field using an automatically controlled tractor. Their results have been good.

The "S-80" type tractor was used, as was the "DT-54."

44. Automation Seminar Held in Moscow

Seminar on Automation in Moscow Concluded 21 May 1959
(Untitled, unsigned item); Moscow, Izvestiya, 22 May 59,
p 4

A brief notice stating that a seminar concerning questions of automation and mechanization in the textile industry had concluded appeared in source.

More than 50 engineers and technicians of Moscow, Leningrad, Ivanovo, Vladimir, and other areas participated.

45. Chemical Industry Automation

"On the Main Directions of Automation in the Chemical Industry," by N. Festa, Chief Engineer of the Research-Construction Bureau on Automation of Chemistry, State Committee of the Council of Ministers of the USSR; Moscow, Pravda, 16 May 59, p 2

In an address at the 21st Congress of the CPSU, N. S. Khrushchev stated that fundamental attention will be given to the chemical industry in the 7-year plan.

Experiments have proved that automation of chemical manufacturing yields an enormous economical effect and pays for itself in the course of a very short time. For example, automation of the acetic acid reclaiming department at the Vladimirska chemical plant increased productivity 45 percent and reduced costs 15 percent, paying for itself within 2.5 months.

In the article, the author arrives at the following conclusions: to guarantee the accomplishing of the program for accelerating development of the chemical industry on the basis of its complex mechanization and automation, it is necessary to advance the role and responsibility of conducting the works of the industry according to mechanization and automation; it is also required to develop means for stimulating the interest of the workers in more effective mechanization and automation of fundamental and subsidiary processes.

The author suggests construction of one state system of instruments built on the aggregate principle.

[For additional information on electronics see also Mathematics.]

Instruments and Equipment

46. Oscillations in Nonslotted Magnetron

"Oscillations of Rotary-Wave Mode in a Nonslotted Magnetron," by M. I. Kuznetsov and V. Ye. Nechayev, Radiophysics Research Institute at Gor'kiy University; Gor'kiy, Izvestiya Vysshikh Uchebnykh Zavedeniy, Radiofizika, No 4, 1958, pp 126-130

It was shown experimentally that under certain conditions self-oscillations of rotary-wave mode can be set up in a cylindrical nonslotted magnetron. The experiment consisted in measurement of the phase difference between the currents induced in the process of self-oscillations on small sections of the plate at different azimuthal positions. For azimuth-symmetrical movement of the space charge, the induced currents will be in phase. If the self-oscillations of the space charge have a rotary-wave mode, then a phase shift will be established between the currents. Such a phase shift is readily detected for any known angular distance between specific sections on the plate. The measurements were taken with a specially constructed tube, in the plate cylinder of which were cut three round holes fitted with small disks. The plate and the cathode of the tube were short-circuited with respect to the high-frequency energy with the aid of special cylindrical mica capacitors. The angular space between disk centers is 75° , 105° , and 180° . The currents induced in the measuring disks are fed through coaxial cable to the input of a phase-measuring device. The input impedance of the phase-measuring device is equal to the characteristic impedance of the line. The voltages at the input of the phase-measuring devices have the same phase relation as the corresponding currents induced in the measuring disks. Any of these two voltages are admitted to the

electronic commutator switch, which connects them alternately at a rate of 50 connections per second to a superheterodyne receiver with several frequency converters.

The phase measurement was carried out with the aid of an oscillograph. The investigation was conducted in the frequency range of 90 to 120 Mc.

47. Ultrahigh-Speed Camera

"Electronic Instruments of the Seven-Year Plan" (unsigned article); Moscow, Radio, No 5, May 59, cover page

CPYRGHT The article contains the following passage:

"At the exposition of National (USSR) Economy Achievements, which was opened at the time of the 21st Congress of the CPSU, new electronic instruments used in various branches of national economy were displayed.

"Great interest was aroused by a device called a 'Time Magnifier,' which utilized the principle of multiple reflection. With the aid of this device, it is possible to photograph fast processes, such as explosions and plasma formation during nuclear reactions. The speed of photographing on a stationary film can be as high as 33 million pictures (frames) per second."

Radar

48. Detection of Radar Signals

"Rising Probability of Detecting Radar Station Signals," by N. M. Sedyakin; Moscow, Radiotekhnika, No 5, May 59, pp 44-48

The probability of detecting a radar station signal depends on the probability of the signal reception for a single rotation of the antenna, as well as on the repetition of such receptions. The analysis of detecting radar signals is carried out with the help of special radio-engineering equipment. A formula is derived for calculation of the rising probability of detecting signals depending on the probability of signal reception, as well as the number of antenna rotations per unit time.

49. Shipborne Radar "Don"

"Penetration Through the Darkness," by I. Artem'yev; Moscow, Izobretatel' i Ratsionalizator, No 4, Apr 59, pp 35-37

The shipborne radar station "Don" can detect the presence of a large ship at a distance of 14 miles and a sea bouy at a distance of 3.5 miles, thus assuring safe navigation of a ship under conditions of complete invisibility. The staion has six range scales: the short-range scale permits observation at a distance from 50 meters to 1.3 kilometers and has only one range ring for 800 meters from the ship; the long-range scale displays objects as far as 80 kilometers from the ship and has the range rings spaced every 16 kilometers.

On some large ships, a remote operated plan-position indicator (called "Pal'ma") is installed on the captain's bridge or in the pilot cabin.

Work is now being conducted so as to have plan-position display in the form of a "stationary" map of the sea on which the ship itself is moving. This can be accomplished if the data on the speed and the direction of the ship motion are measured continuously and are fed to a computer, which shifts the center of scanning in accordance with these data.

III. ENGINEERING

50. Simplified Method of Computing Variable Parameters of Control Systems

"An Approximate Method of Investigating Linear Systems With Variable Parameters," by N. T. Kuzovkov, Moscow; Moscow, Izvestiya Akademii Nauk SSSR, Otdeleniye Tekhnicheskikh Nauk, Energetika i Avtomatika, No 2, Mar/Apr 59, pp 60-64

An automatic control system is considered which consists of one fixed section and a certain number of variable sections, the latter being described by linear differential equations of a low order. It is shown that, for an arbitrary fixed moment of time, the variable section can be substituted by an equivalent section which is, to a certain extent, invariable, thus affording the possibility of studying a system of automatic control by means of common (for example, frequency) methods devised for systems with fixed parameters.

The approximate method considered in this article affords the possibility of studying variable systems without resorting to complex mathematical treatment, inasmuch as already well-established methods of calculating systems with fixed parameters can be applied.

51. Heat Transfer During Change of Temperature in Jet Engine Jacket

"One Problem of Nonstationary Heat Transfer," by V. S. Zarubin, Moscow; Moscow, Izvestiya Akademii Nauk SSSR, Otdeleniye Tekhnicheskikh Nauk, Energetika i Avtomatika, No 2, Mar/Apr 59, pp 38-44

This article investigates the transient heat processes which occur in the jacket of a jet engine when the temperature of the jacket is both changing and below the temperature of continuous operation, i.e., during the starting, running, or stopping of the engine. The temperature of the jacket during continuous operation is used as a limit which is approached by the temperature distribution in the jacket during periods of transient heat exchange.

52. Velocity of Propagation of Flame at Subatmospheric Pressures

"The Influence of Pressure on the Velocity of Propagation of a Flame in a Turbulent Flow," by S. A. Gol'denberg and V. S. Pelevin, Power Engineering Institute, Academy of Sciences USSR, Moscow; Moscow, Izvestiya Akademii Nauk SSSR, Otdeleniye Tekhnicheskikh Nauk, Energetika i Avtomatika, No 2, Mar/Apr 59, pp 26-31

This article describes the process of the propagation of a flame under subatmospheric pressures in a previously well-mixed combustible mixture. The results obtained here are in good agreement with those obtained in a similar, but entirely independent, investigation by V. Ye. Doroshenko and A. I. Nikitskiy. No literature references are given.

53. Flame Propagation in a Turbulent Flow

"The Influence of a Pulsation of Flow on the Turbulent Velocity of the Propagation of a Flame," by L. S. Kozachenko, Moscow; Moscow, Izvestiya Akademii Nauk SSSR, Otdeleniye Tekhnicheskikh Nauk, Energetika i Avtomatika, No 2, Mar/Apr 59, pp 21-25

In an investigation of the mechanism of propagation of a flame in a turbulent flow, a description is given of a jet which affords the possibility of using various turbulence-producing devices, with which the degree of turbulence varies from 1.7 to 15.7 percent. A measurement of the turbulent characteristics by means of an anemometer with a glow discharge, and with a thermo-anemometer, revealed the lack of inertia of the glow discharge at a pulsation frequency of 20 kilocycles as well as the possibility of using it under laboratory conditions. An experimental evaluation is given of the role of the pulsation of flow in the propagation of a flame in a combustible mixture.

The article also gives some results of measurements of the pulsation of flow beyond various types of turbulence-producing devices under conditions of isothermal flow and combustion of a homogenous fuel-air mixture.

It is shown that the turbulent velocity of a flame may be determined in the form of the sum

$$u_T = u_H + u' + u'',$$

where u_H is the normal velocity of propagation of the flame, u' is the average quadratic pulsation of the isothermal flow, and u'' is the supplementary pulsation generated by the flame.

The installation used in the experiments has a device for measuring the consumption of air and fuel and a Teplerov chamber for the cinematic recording of the dimensions of the zone of combustion by means of a series of spark discharges.

54. Combustion Regimes in Jet Engines

"The Lower Branch of the Hugoniot Curve as a Series of Points Indicating Combustion Regimes in Jet Engines," by Ya. K. Troshin, Institute of Chemical Physics, Moscow; Moscow, Izvestiya Akademii Nauk SSSR, Otdeleniya Tekhnicheskikh Nauk, Energetika i Avtomatika, No 2, Mar/Apr 59, pp 3-12

This article shows that, in the case of a specific idealization, the lower branch of the Hugoniot curve indicates actual combustion regimes in tubes, including the combustion chambers of jet engines.

A relationship is established between the location, on this curve of a point which is responsible for a particular combustion regime in the chamber and the degree of constriction of the supersonic Laval exit nozzle.

Relationships are also given, on the basis of which it is possible, in the first approximation, to evaluate the principal parameters of the engine and to judge the degree of forced combustion in the chamber.

55. Quantitative Determination of Flame Structure

"On the Structure of a Turbulent Flame of Homogeneous and Heterogeneous Mixtures," by V. Ya. Basevich and S. M. Kogarko, Institute of Chemical Physics, Moscow; Moscow, Izvestiya Akademii Nauk SSSR, Otdeleniya Tekhnicheskikh Nauk, Energetika i Avtomatika, No 2, Mar/Apr 59, pp 13-20

The article points out that, according to current ideas on possible mechanisms of turbulent flames, it is possible to detect original unreacted fuel both in the tongue of a turbulent flame of a homogeneous mixture as well as in its combustion products, but that, apparently, the quantitative side of this problem has not been investigated sufficiently.

This article presents a method of determining the concentration and temperature of a fuel and the velocity of its combustion in turbulent flames, which makes it possible to arrive at information on the structure of these flames.

56. Thermoelectric Generators

"Unusual Boiler," by A. Cherkasskiy, Moscow, Izobretatel' i Ratsionalizator, No 4, Apr 59, pp 10-11.

At the All-Union Scientific Research Institute for Rural Electrification and the Institute of Semiconductors, Academy of Sciences USSR, a boiler-thermogenerator unit was designed by A. V. Demin, A. N. Voronin and A. Cherkasskiy.

The interior walls of this boiler are lined with a great number of thermal elements. These elements are separated from hot gases by corrugated cast-iron plates which are heated by the gases of combustion to a temperature of about 400°C. The side facing the thermal elements also attains a temperature of about 400°C. The exterior sides of the thermal elements are in contact with a water-filled jacket, where the water is maintained at about 105°C. Thus a temperature gradient of about 250°C exists between the hot and cold junctions. This boiler, when burning about 35 kilograms of firewood with 40% moisture, will generate 80 kilograms of steam at 0.25 atm pressure and 250 watts of electric power. The over-all efficiency of the boiler is about 60%.

Such thermoelectric power and heat installations will find wide application in rural districts. A number of inventors are now working on design of a thermal generator in which the heat exchange medium will be a high-temperature liquid.

IV. MATHEMATICS

57. Kinetic Equation for a Sphere Solved Numerically by New Method

"Numerical Solution of the Kinetic Equation for a Sphere," by
V. S. Vladimirov; Moscow, Vychislitel'naya Matematika, No 3,
Jul 58, pp 3-33

The stationary distribution of neutrons $\psi(e, E, \mu)$ in a spherically symmetric reactor satisfies the following linear, integral-differential equation of Boltzman:

$$\mu \frac{\partial \psi}{\partial r} + \frac{1-\mu^2}{r} \frac{\partial \psi}{\partial \mu} + \alpha(r, E) \psi =$$

$$\sum_k \int_E^\infty \int_{-1}^1 \int_0^{2\pi} \alpha_k^{(s)}(r, E') w_k(E', E, \mu_0) \psi(r, E', \mu')$$

$$dE' d\mu' d\varphi +$$

(0.1)

$$+ 2\pi \sum_k \int_0^\infty \int_{-1}^1 \alpha_k^{(f)}(r, E') v_k(E', E) \psi(r, E', \mu') dE' d\mu' +$$

$$q(r, E, \mu),$$

$$0 < r < R, \quad -1 < \mu < 1, \quad 0 < E < \infty,$$

where $w_k(E, E', \mu_0)$ is the indicatrix of dispersion and

$\mu_0 = \mu \mu' + \cos \psi \sqrt{1 - \mu^2} \times \sqrt{1 - \mu'^2}$. When the so-called "half" boundary condition $\psi(R, E, \mu) = 0, \mu \leq 0$, (0.2) accompanies the equation (0.1), it expresses the absence of a current of neutrons from without on the boundary of the sphere.

Further details associated with the physics of the process, described by the equation (0.1), and also the significance of the designations introduced may be found in the work of S. M. Feynberg, "Several Problems of the Theory of a Uranium-Water Lattice," Izda-vo AN SSSR, 1955, presented at the session of the Academy of Sciences devoted to the Peaceful Utilization of Atomic Energy held 1-5 July, 1955, and in the survey of R. E. Marshak, "Theory of the Slowing Down of Neutrons by Elastic Collision With Atomic Nuclei," Revs Mod. Phys., Vol 19, 1947.

Numerical solution of the problem (0.1) -- (0.2) is extremely complicated. For that reason it is required to construct an approximation to the problem (0.1)-(0.2) within the framework of which systems of numerical solution are developed.

The simplest approximation to the Boltzman equation is the so-called growth approximation, presented in the work of Marshak referred to above and also in the book of S. Glasstone and M. Edlund, "Fundamental Theory of Nuclear Reactors", (Russian Translation published 1954). Methods for the numerical solution of the growth equation, in particular, the division into energy groups, were considered in the paper of Thompson, J. Appl. Phys., Vol 22, No 10, 1951, in the work of R. Ehrlich and H. Hurwitz, "Multigroup Methods for Neutron Diffusion Problems," Nucleonics, Vol 12, 1954, and the works of G. I. Marchuk, "Multiple Group Method of Calculation of the Reactor of an Atomic Electro Power Plant," Atomnaya Energiya, Vol 2, 1956 and "On the Problem concerning the Multiple Group Method of Calculation of Nuclear Reactors," Atomnaya Energiya, No 1, 1958.

The growth theory does not always guarantee sufficient accuracy of the approximation. For that reason, the more exact m-group approximation is employed.

In the present paper, another method is presented for the numerical solution of the single group equation

$$\frac{1}{\alpha(r)} \left(\mu \frac{\partial \psi}{\partial r} + \frac{1-\mu^2}{r} \frac{\partial \psi}{\partial \mu} \right) + \psi(r, \mu) =$$

$$\frac{\lambda}{2} h(r) \int_{-1}^1 \psi(r, \mu') d\mu' + f(r)$$

with the boundary condition $\psi(R, \mu) = 0, \mu \leq 0$.

58. Hilbert and Poincare Problems Solved Approximately

"An Approximation Method for the Solution of Hilbert and Poincare Problems," by L. S. Klabukova; Moscow, Vychislitel'naya Matematika, No 3, Jul 58, pp 34-87

An approximation method is presented for the solution of the Poincare problem for the equation

$$\frac{\partial^2 w}{\partial x^2} + \frac{\partial^2 w}{\partial y^2} + p(x, y) \frac{\partial w}{\partial x} + q(x, y) \frac{\partial w}{\partial y} = 0,$$

where $p(x, y)$ and $q(x, y)$ are continuous functions of x and y in the region considered which is assumed to be simply connected.

From the point of view of questions of solvability and uniqueness reference is made to the works of I. N. Vekua, "Systems of Differential Equations of the First Order of the Elliptic Type and Boundary Value Problems With Application to the Theory of Envelopes," Matematicheskiiy Sbornik, Vol 31, No (73), 2, 1952; "Concerning a Boundary Value Problem of Riemann," Trudy Tbilisskogo Matematicheskogo In-ta, Vol 11, 1942, "A Boundary Value Problem With an Oblique Derivative for an Elliptic Type Equation," Dokl. AN SSSR, Vol 92, No 6, 1953 and Novyye Metody dlya Resheniya Ellipticheskikh Uravneniy (New Methods for the Solution of Elliptic Equations), Gostekhizdat, 1948. In these works the general forms of the solutions are given and a means is indicated for reducing the problems to an appropriate integral equation.

In the present work two approximation methods are considered for solution of the problem: for the case when the coefficients $p(x, y)$ and $q(x, y)$ are sufficiently small, and for the case when the coefficients are of arbitrary magnitude.

In the case of small coefficients the Poincare problem reduces to a boundary value problem for a generalized Cauchy-Riemann system which is solved approximately by replacing the system of differential equations by a system of difference equations.

In the case of coefficients of an arbitrary magnitude, that is, the general case, the Poincare problem reduces to finding a solution of the corresponding integral equation. The solution of that equation is sought approximately in the form of a polynomial satisfying the equation with the least quadratic error. Description of these methods of approximation is given in Parts III and IV of the work.

An approximation method for the solution of the Hilbert problem is considered in Part II. The problem is solved by the method of finite differences, preliminarily reducing it to two Dirichlet problems.

The reduction of a Hilbert problem to two Dirichlet problems is studied in the second work of I. N. Vekua mentioned above. Thus, since solving Poincare and Hilbert problems requires the finding of a holomorphic function according to a given real part on the boundary of a region, (Dirichlet problem), an approximation method is proposed in part I for the solution of a Dirichlet problem with an error not exceeding quantities of the order $O(h^2)$ at points of the grid.

59. Least Characteristic Number of Payerls Equation Found Approximately by Monte Carlo Method

"Calculation of the Least Characteristic Number of the Payerls Equation by the Monte Carlo Method," by V. S. Vladimirov and I. M. Sobol'; Moscow, Vychislitel'naya Matematika, No 3, Jul 58, pp 130-137

Determination of the critical values of a nuclear reactor in the simpler cases reduces to calculation of the least characteristic number of the integral equation of Payerls; namely,

$$n(P) = \lambda \int_G \alpha(P') h(P') \frac{\exp(-|P-P'|) \int_0^1 \alpha[tP + (1-t)P'] dt}{4|P-P'|^2} n(P') dP' = \lambda Kn. \quad (1)$$

In this equation G denotes a finite region where the process of diffusion of neutrons takes place; the functions $\alpha(P')$ and $h(P')$ are assumed to be positive and piece-wise continuous in G .

The characteristic numbers of the equation (1) were then designated by λ_1 and their corresponding eigen functions were designated by $n_1(P)$.

It is known (V. S. Vladimirov, "On an Integral-Differential Equations," Izv. AN SSSR, Seriya Matematicheskaya, No 21, 1957), that

$$\frac{1}{H(1-e^{-Ad})} \leq \lambda_1 \leq \lambda_2 \leq \lambda_3 \leq \dots,$$

where $A = \sup \alpha(P)$, $H = \sup h(P)$, and d is the diameter of the region G . In addition, the least characteristic number λ_1 is the limit of the sequence of numbers

$$\lambda_{(k)} = \frac{(\varphi_{k-1}, \psi)}{(\varphi_k, \psi)},$$

where $\varphi_k = k^k \psi_0$ is the k -th iteration function of φ_0 ; $\varphi_0(P)$ and $\psi(P)$ are arbitrary, positive, piece-wise continuous functions in G .

The scalar product $(\varphi, \psi) = \int_G \alpha(P) h(P) \varphi(P) \psi(P) dP$ is taken according to the weight αh . For $\varphi_0 = \psi$, the inequalities

$$0 \leq (k)^{-\lambda_1} \leq C \left(\frac{\lambda_1}{\lambda_2} \right)^k, \quad \lambda_{(k+1)} \leq \lambda_{(k)}, \quad k=1, 2, \dots \text{ hold,}$$

according to the papers: V. S. Vladimov, "Concerning the Application of the Monte Carlo Method for Finding the Least Characteristic Number and the Corresponding Eigen Function of a Linear, Integral Equation," Teoriya Veroyatnosti i yeye Primeneniye, Vol 1, No 1, 1956 and the paper of the author referred to above. Details concerning the equation (1) may also be found in the first reference.

In this manner our problem reduces to finding the positive numbers (φ_k, ψ) , $k=1, 2, \dots$. In the present work these numbers were calculated by the Monte Carlo Method.

60. Example of Flow in a Subsonic Flow of Gas Approximated

"Calculation of the Flow Around an Arbitrary Profile and a Body of Rotation in a Subsonic Flow of Gas," by P. I. Chushkin; Moscow, Vychislitel'naya Matematika, No 3, Jul 58, pp 99-110

In the work an approximate calculation of the subsonic flow around an arbitrary symmetric profile and a body of rotation is considered for an angle of attack of zero. The solution is obtained with the help of the numerical method proposed by Academician A. A. Dorodnitsyn, "Concerning One Method for the Numerical Solution of Certain Nonlinear Problems of Aerodynamics," Trudy 3-go Vsesoyuz. Mat. S'yezda, No 2, 1956, which has already been employed for other two dimensional nonlinear problems of gas dynamics; namely, in the works: P. I. Chushkin, "Calculation of Several Audible Gas Flows," Prikl. Matematika i Mekhanika, Vol 21, No 3, 1957, P. I. Chushkin, "The Flow Around Ellipses and Ellipsoids of a Subsonic Flow of Gas," Vychislitel'naya Matematika, No 2, 1957, and in the work of O. M. Belotserkovskiy, "The Flow Around a Circular Cylinder with a Departing Shock Wave," Dokl. AN SSSR, Vol 113, No 3, 1957.

61. Hungarian and Foreign Mathematicians Meet

"A report on the Mathematical Colloquia," by Gyorgy Adler; Budapest, Magyar Tudomány, Vol IV, No 1, Jan 59, pp 43-44

Since 1953, the Janos Bolyai Mathematical Society has held yearly mathematical colloquia. In 1958, four colloquia were held at the Academy of Sciences resort in Balatonvilagos. From 22 to 24 September there was a colloquium on the Monte Carlo method and another on matrix theory and its applications; from 25 to 27 September there was a colloquium on function analysis and another on diophantic approximations.

About 100 persons participated in the colloquia including 16 foreign guests: R. Bartosinski (Poland); Yu. M. Berezanskiy (Soviet Union); J. W. S. Cassels (England); St. Hartmann (Poland); S. Knapowski (Poland); I. P. Kubilius (Soviet Union); W. J. Le Veque (US); S. Marcus (Romania); K. Maruhn (German Democratic Republic); H. Muller (German Democratic Republic); A. Schinzel (Poland); L. Schmetterer (German Democratic Republic); A. Spacek (Czechoslovakia); Gyorgy Szekeres (Australia); S. L. Sobol'yev (Soviet Union); and S. Zubrzycki (Poland).

Alfred Renyi, who was in charge of the colloquium on the Monte Carlo method, presented a paper which dealt with the method in general. I. P. Kubilius discussed a number theory model of Brownian movement. Andras Prekopa discussed practical applications of the Monte Carlo method to the measurement of power plant reservoirs.

Jeno Egervary, who was in charge of the colloquium on matrix theory and its applications, reported on a constructive method for putting matrices into the so-called Jordan normal form. Gyorgy Szekeres, a Hungarian living in Australia, read a paper titled "Concerning Polar and Cyclic Production of Matrices."

Bela Szokefalva-Nagy, who was in charge of the colloquium on function analysis, reported on his new achievements in the area of operator theory. S. L. Sobol'yev, Soviet Academician, reported on an important new theory pertaining to integration of abstract set functions. H. Muller, Dresden, reported on new procedures for non-linear unique value problems.

Pal Turan was in charge of the colloquium on diophantic approximations. Pal Erdos read two papers on his achievements.

V. MEDICINE

Antibiotics

62. Investigation of the Antibiotics Virusin 16-09, Luridine (111) and 587/13

"Investigation of the Methods of Isolation and of the Properties of the Antibiotics Virusin 16-09, Luridine (111), and the Antibiotic 587/13," by D. M. Trakhtenberg, V. M. Baykina, E. I. Rodionovskaya, I. M. Prosnyakova, O. A. Kalinovskiy, Yu. V. Zakharova, and A. S. Khokhlov, All-Union Scientific-Research Institute of Antibiotics; Moscow, Antibiotiki, Vol IV, No 2, Mar/Apr 59, pp 9-14

The article describes the methods of isolation and the properties of virusin 16-09 and luridine (111), antibiotics possessing antiviral activity, and antibiotic 587/13 active against different species of Candida. An examination of the raw materials and hydrochlorides of the antibiotics virusin 16-09 and luridine (111) revealed that they are closely related as to their chemical and physical properties and their biological action; that all three antibiotics are pharmacologically closely related, and on the basis of the chemical, physical, and biological properties may be classed with the streptothricin group of antibiotics.

63. Antibacterial Action of Crystallomycin

"Investigation of the Antibacterial Action of Crystallomycin in Vitro," by S. P. Shapovalova, Institute for the Search of New Antibiotics, Academy of Medical Sciences USSR; Moscow, Antibiotiki, Vol IV, No 2, Mar/Apr 59, pp 45-49

Investigation conducted to determine the bactericidal properties of crystallomycin, a new antibiotic developed at the Institute for the Search of New Antibiotics, revealed that it mainly suppresses gram-positive organisms: pneumococci, streptococci, staphylococci, enterococci, listerella, and some strains of the diphtheria bacillus are particularly sensitive to the antibiotic. Gonococci and some strains of meningococci are the only gram-negative bacteria sensitive to crystallomycin.

64. Physiological Properties of Streptomyces melanochromogenes

"Streptomyces melanochromogenes n. sp. as the Source of Actinomycin K," by Tsai Yung-sheng, Sui Ts'u-yuan, Pao Chin-chu, Liang Shu-fang, W. Kurylowicz, Weishenwu Hsuehpao, Acta microbiol. sinica (China), 1958, 6, No 2, 151-157 (from Referativnyy Zhurnal--Khimiya, Biologicheskaya Khimiya, No 5, 10 Mar 59, abstract No 5261, by A. Gorodetskaya)

CPYRGHT

"The physiological properties of Streptomyces melanochromogenes 1779 (I), the organism which grows in the presence of glucose, maltose, starch, and dextrine, but not in the presence of D-xylose, saccharose, and raffinose are described. (I) is capable of utilizing ammonium sulphate and chloride, D-glucosamine, urea, and a number of amino acids. (I) does not grow in the presence of thymine, uracil, and is suppressed by NaNO_2 . Under laboratory conditions, 10 liters of the cultural liquid of (I) produce 4.4 grams of actinomycin K, which is active against gram positive bacteria and Ehrlich's carcinoma in vitro and in vivo (in mice)."

65. Antibiotics Obtained From Lichens

"Derivation of Antibiotics From Some of the Local Lichens and Their Action," by Boguslaw Borkowski, Henryk Gertig, Janusz Jeljaszewicz, Dissert. pharmac. PAN (Poland), 1958, 10, No 2, 99-107 (from Referativnyy Zhurnal--Khimiya, Biologicheskaya Khimiya, No 5, 10 Mar 59, abstract No 5269, by V. Kovalenkova)

CPYRGHT

"Substances identified as D-usnicic acid, physodic acid, anthranorine, and others were obtained as a result of the study of a group of lichens as antibiotic producers. A test of the antimicrobial spectrum of the antibiotics revealed the effect of the sodium salt of D-usnicic acid on Mycobacterium tuberculosis."

66. Toxicity of Antibiotics

"Toxic Reactions in the Therapeutic Application of Antibiotics," by U. A. Askarov, Third Chair of Therapy, Central Institute for the Advanced Training of Physicians; Moscow, Antibiotiki, Vol IV, No 2, Mar/Apr 59, pp 108-110

On the basis of clinical observations and literary data available, it has been determined that: penicillin, streptomycin, chlortetracycline, synthomycin, and levomycetin are the least harmful antibiotics; and that the following factors play an important role in the development of toxic reactions in the use of antibiotics: (1) the quality of the preparations

(purity); (2) the dose and duration of therapy; (3) place and method of administration; (4) the general condition of the organism and the course of the disease; (5) the etiological factor, that is the nature of the causative agent of the disease.

67. Derivation of Tetracycline

"Derivation of Tetracycline (Achromycin) by Means of Deep Fermentation of the Streptomyces aureofaciens Strain," by D. Kotiuszko, O. Lubinski, Z. Ruczaj, J. Ruszczynski, W. Sobiczewski, Med. doswiad. i microbiol. (Poland), 1958, 10, No 2, 153-164 (from Referativnyy Zhurnal--Khimiya, Biologicheskaya Khimiya, No 5, 10 Mar 59, abstract No 5266, by V. Kovalenkova)

CPYRGHT

"When the Streptomyces aureofaciens strain No 57530 was cultivated in test tubes placed on rocking devices, the antibiotic yield was 1900 gamma per milliliter. Tetracycline was separated from the culture liquid by extraction with organic solvents. The preparations which were obtained contained from 52 to 86 percent of tetracycline with an activity of 910 gamma per milligram."

68. Yugoslavia Is Third Country to Produce Oxytetracycline

"Third Patent in the World," by Pero Kesovija, Zagreb; Borba, 11 May 59, p 4

Stipe Splivalo, director of the Pliva Chemical and Pharmaceutical Factory in Zagreb, Dr Engr Rativoj Sajvert, Dr Gavro Tamburasev, and Engr Zrinka Tamburasev have received the City of Zagreb Award for their discovery of a process for obtaining oxytetracycline (terramycin) which is called geomycin in Yugoslavia. The process is patented in the [Yugoslav] Federal Office of Patents. After the US and the USSR, this is the third patent in the world issued for the production of this antibiotic.

During the early part of 1957, laboratory research was begun to discover a process for producing geomycin. The semi-industrial production of geomycin was begun on 29 November 1958. About 2 kilograms of the antibiotic are produced every 5 days.

Bacteriology

69. Tick-Borne Encephalitis Virus Cultured in Human and Animal Tissues

"The Study of the Development of the Tick-Borne Encephalitis Virus in Human and Animal Tissue Cultures," by G. D. Zasukhina, Institute of Virology imeni D. I. Ivanovskiy; Moscow, Voprosy Virusologii, Vol 4, No 2, Mar/Apr 59, pp 198-203

This article reports a study of the adaptation and intensity of replication of the tick-borne encephalitis virus, and its capacity to exert specific cytopathogenic action, depending on the type of tissue, in vitro. Tissues of animals which are highly and weakly susceptible to tick-borne encephalitis, connective tissue and epithelial tissues, normal and tumorous tissues, and embryonal or postnatal tissues of humans and animals were used; the "Sof'in" strain of the virus, passed in the laboratory in white mice in 1937, was employed. Replication was regularly achieved by culturing this virus in the various tissue cultures. The methodology and results are described in detail.

The author's conclusions are as follows:
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"1. The virus of tick-borne encephalitis is successfully replicated in human embryo tissue cultures, HeLa cells, monkey and dog kidney tissue, cutaneous-muscular tissue of white mice and rats, and in various chick embryo tissue cultures.

"2. The maximum virus titers in all tissue cultures are observed on the 3d-8th day after infection.

"3. The most intensive virus replication was noted in cultures of cutaneous-muscular and human kidney tissue, and in HeLa cells.

"4. Cytopathogenic action is observed regularly in cultures of cutaneous-muscular and human kidney tissue on the 2nd-4th day after infection.

"5. Virus titers determined according to the cytopathogenic effect correspond to the titers in mice.

"6. Cytopathogenic action of the virus does not occur in the presence of serum from tick-borne encephalitis patients.

"7. Cytopathogenic action is registered in several passages in cultures of embryonal cutaneous-muscular tissue of white rats.

"8. Cytopathogenic action of the virus does not appear in cultures of human lung tissue, HeLa cells, monkey and dog kidney tissue, cutaneous-muscular tissue of white mice, and chick embryo tissue."

70. Hexachloran Properties as a Bactericide

"Antimicrobial Properties of Hexachloran," by A. S. Avakyan, Tr. Yerevansk. zootekhn.-vet. in-ta (Works of the Yerevan Zootechnical-veterinary Institute), 1957, No 22, 129-131 (from Referativnyy Zhurnal--Khimiya. Biologicheskaya-Khimiya, No 5, 10 Mar 59, abstract No 5257, by S. Shapovalova)

CPYRGHT

"Undiluted hexachloran arrests the growth of *Staphylococcus albi*, *Staphylococcus flavi*, *Bacterium mesentericus*, *Bacterium suispestifer*, and *Bacterium anthracidis*. Hexachloran in a mixture with meat-peptone agar and with a dilution of 1:1500 arrests the growth of staphylococci. Ten percent hexachloran (diluted with meat-peptone agar) possesses bactericidal properties with regard to *Staphylococci albi* and *Staphylococci flavi*."

71. Comments on the Seventh International Congress of Microbiologists

"Problems of Virology at the VII International Congress of Microbiologists," by V. M. Zhdanov; Moscow, Voprosy Virusologii, No 1, Jan/Feb 58, pp 127-123

CPYRGHT

"The VII International Congress of Microbiologists was held in Stockholm 4-9 August 1958. More than 1,000 microbiologists from various countries of the world participated in the congress. The Soviet delegation consisted of 46 persons.

"Considerable attention in the work of the congress was devoted to the problem of virology. Four out of six reports were completely or partially devoted to this subject. The symposium on latent and unapparent infections, at which reports by A. L'vov, S. U. Bennet, K. Maramorsha, and R. E. Shoppe were heard, aroused particularly great interest. The study of latent viruses is of interest not only as a biological or ecological problem, but is also important in understanding the pathogenesis of malignant tumors.

"A. L'vov, giving the principal report on latency at the cellular level, called the interrelationship between the virus, cell, and host 'the problem of three entities', thereby emphasizing the importance of the problem and the complexity of its resolution.

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"Twenty-five section meetings were held concurrently with the symposium. Meetings of the sections on: the synthesis and replication of viruses; the biology and transmission of viruses; and inactivation of viruses; were devoted to the problem of viruses. However, many other sections devoted their work to different problems connected with virus infections. Compound reports on disputable problems were not presented at the section meetings as a rule, but individual, primarily original investigations were reported; inasmuch as summaries of the reports were published earlier, many of them were not reported but were only announced for discussion. The absence of compound problem reports in the sections should be attributed to inadequacies of research, since individual, frequently detailed questions were considered, and general information concerning the status of and prospects for the further development of one problem or another was not gained by the participants. This is applicable, in particular, to such important problems as the synthesis and replication of viruses, and the modifiability of viruses.

"Special problems concerning individual virus infections were not considered. Specifically, in connection with which, such an important problem of virology as influenza was presented in 2 or 3 short reports, which were not even discussed. Therefore, a special extra session meeting devoted to this problem had to be held by the participants of the congress.

"On the whole, however, the congress terminated completely satisfactorily, and, undoubtedly contributed much toward the further development of virology. The high percentage of virological problems at the congress, the high attendance at the meetings of the virological sections, and the lively discussion of problems attested to the fact that virology is the most important branch of general and medical microbiology, and its advancement has general biological significance."

Epidemiology

72. New Plague Vector

"A New Spontaneous Carrier of Plague--the Flea *Leptopsylla taschenbergi* Wagn. (1898)," by R. V. Kovaleva and N. L. Gershovich, Moscow Observation Station, Ministry of Health USSR; Moscow, Zoologicheskii Zhurnal, Vol 38, No 3, Mar 59, pp 489-490

This article reports that two cultures of *Pasteurella pestis* were isolated from a new vector--the flea *Leptopsylla taschenbergi* Wagn.--during a 1958 plague epizootic affecting an unusually large number of domestic mice (*Mus musculus* L.) in Mskatskiy and Zhilokosinskiy Rayons of Gur'yevskaya Oblast. Heretofore, this flea was considered to be a specific parasite of field mice (*Apodemus agrarius* Pall.). The flea is

found chiefly in the Caucasus but it is also found in Central Asia, Kazakhstan, the Crimea, Southeastern USSR, and Stavropol'skiy Kray. The two strains isolated were found to be highly virulent to white mice and guinea pigs.

73. Role of Water in the Spread of Tularemia

"The Possible Significance of Water in Tularemia Infection of Animals in Natural Foci," by T. N. Dunayeva, Department of Infections With Natural Foci, Institute of Epidemiology and Microbiology; Moscow, Zoologicheskii Zhurnal, Vol 38, No 3, Mar 59, pp 347-354

The experiments described in this article were set up to determine the importance of water in the epidemiology of tularemia. Corpses of small rodents (water rats, Norwegian lemmings, white mice) which had died of tularemia were cut open, placed in glass jars, and covered with water (to approximate natural conditions under which dead rodents are damaged in water); the water was later titrated to determine the amount of tularemia pathogen in it. Another series of experiments was performed to explore the possibility of infection occurring after animals come in contact with infected water. For this purpose wild animals were placed in vats containing 20-30 liters of water infected with virulent strain No 503. Results of these experiments are given in tabular form and are discussed in the text.

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The results obtained and conclusions drawn are as follows:

"1. Experiments on the quantitative determination of the extent to which water is infected by the corpses of animals which have died from tularemia (water rats, Norwegian lemmings, and white mice) showed that one corpse can infect 500,000 liters of water.

"2. Brief stays in water containing 100 and 1,000 tularemia pathogens per milliliter produced the infection of 47.7 animals of different species (water rats, lemmings, hamsters, etc.). More than 90% of the animals became infected when the concentration of microbial cells was 10,000 per ml. Wild animals, as a rule, were not infected in water which contained 10 microbial cells per ml.

"3. In a great number of the animals which came in contact with infected water, the infection was contracted through the eyes or the respiratory tract. The penetration of microorganisms through skin which had been damaged or which was not visibly damaged was noted in 10 wild animals (water rats, golden hamsters, and guinea pigs).

"4. In carrying out epizootological observations, the possibility of the infection of animals by infected water must be taken into consideration along with other factors in the transmission of *B. tularensis*."

Helminthology

74. Bloc Parasitologists Organize International Cooperation

"International Parasitology Conference in Budapest, 15-20 September 1958," by Sandor Kotlan; Budapest, Magyar Tudomány, Vol 4, No 2, Feb 59, pp 101-103

Department IV [Biological and Medical Sciences] of the Hungarian Academy of Sciences organized the Budapest Congress of Parasitologists, which was attended by six Soviet, five Polish, nine Czechoslovak, two Bulgarian, one East German, one West German, one English, and about 300 Hungarian veterinary, medical, and biological specialists.

The chief theme was the problem of planned protection against fascioliasis. The Hungarian specialists Ferenc Kovacs and Laszlo Nemeseri reported on new parenteral medication procedures for treating fascioliasis in domestic animals.

On the recommendation of Academician K. I. Skryabin (Moscow) the congress expressed the need for international cooperation in some parasitology problems. Academician Sandor Kotlan (Budapest) was designated to organize for protection against fascioliasis; Academician K. I. Skryabin (Moscow) was designated to organize for protection against echinococcosis; Docent Z. Kozar (Poland) was designated to organize for protection against trichinellosis; Academician O. Jirovec (Prague) was designated to organize for protection against toxoplasmosis; and Academician Ye. N. Pavlovskiy (Leningrad) was designated to organize for protection against natural focus diseases.

The central leader in each problem area develops a program for the solution of the problem in accordance with interested specialists in other countries and when an agreement on cooperation is reached, he obtains the approval of the Scientific Academy and the support of the interested ministry in his own country. Cooperation will include: exchange of literature; exchange of experimental, practical, and theoretical information; mutual urging of official action which will help in solutions; and exchange of specialists.

Immunology and Therapy

75. Immunity Affected by Parasympathetic Nervous System

"Data on the Effect of the Parasympathetic Division of the Nervous System on Immunity Factors," by L. I. Zhigalina, Sb. Tr. Rostovsk. Med. In-ta, (Collected Works of the Rostov Medical Institute, Book 1, 1957, pp 139-152 (from Referativnyy Zhurnal--Biologiya, No 22, 25 Nov 58, abstract No 102396, by K. N. M.)

CPYRGHT

"When the antibody titer began to drop in rabbits immunized with a B. coli culture, the vagus nerve was stimulated with a tetanic electric current of 5-7 MA. The average initial agglutinin titer was 1:2900; after 5 minutes of stimulation, it was 1:6000; and after 5 hours of stimulation, 1:217,255. The titer of the natural agglutinins was not changed. The average titer of hemolysins in correspondingly prepared rabbits was 1:912; after 15 minutes of stimulation, 1:2025; and after 4 hours, 1:32,853. The average initial titer of hemagglutinins was 1:1900, and after 4 hours, 1:42,666. The antitoxin titer increased 7 1/2 times after 6 hours of stimulation. The protective properties of the serum, the leukocyte count (2 1/2 times), and the phagocytic activity of the leukocytes were somewhat increased. The quantity of total proteins diminished as a result of a decrease in albumins. The globulin fraction was almost unaltered."

76. Immunity Affected by Hypothalamic Stimulation

"The Effect of Stimulation of the Hypothalamic Region of the Brain on the Immune Reaction," by I. N. Petrovskiy, Tr. Otchetn. Nauchn. Konferentsii (Rostov-N/D. Med. In-t) za 1956 (Works of the Summary Scientific Conference at Rostov-on-Don Medical Institute in 1956), 1957, pp 591-592 (from Referativnyy Zhurnal--Biologiya, No 22, 25 Nov 58, abstract No 102395, by K. N. M.)

CPYRGHT

"Stimulation with an electric current through electrodes imbedded in various parts of the hypothalamus caused various fluctuations in the antibody titer (TA) in subjects immunized with typhoid and brucellosis antigens. In certain cases stimulation was accompanied by a considerable decrease in the TA; in others, Hypothalamic stimulation caused an increase in the TA. Stronger stimulation will probably lead to irradiation of the stimulation which will cause greater suppression of antibody elaboration."

77. Role of Excitation and Inhibition in Immunity

"The Role of Inhibition and Excitation in Certain Infections and in Immunity. Report II. The Significance of Inhibition and Excitation in Immunogenesis," by B. L. Palant, Tr. Khar'kovsk. N. -I. In-ta Vaktsin i Syvorotok (Works of the Khar'kov Scientific Research Institute of Vaccines and Sera), No 24, 1957, pp 9-15 (from Referativnyy Zhurnal--Biologiya, No 22, 25 Nov 58, abstract No 10293, by K. N. M.)

CPYRGHT

"Rabbits were immunized with combined antiwhooping cough antigen (KA; whooping cough anatoxin and whooping cough heat vaccine) and a mixture of KA and diphtheria anatoxin. Urethane sleep after the introduction of antigen suppressed the elaboration of agglutinins and antitoxins. The antibody titer was increased considerably after excitation caused by caffeine."

78. Therapy of Tick Spirochetoses

"Combined Application of Antibiotics in Experimental Tick Spirochetoses," by T. P. Vertogradova, Laboratory of the Experimental Study of the Therapeutic Properties of new Antibiotics of the Institute for the Search of New Antibiotics, Academy of Medical Sciences USSR; Moscow, Antibiotiki, Vol IV, No 2, Mar/Apr 59, pp 89-93

Guinea pigs and mice were used in experiments which were conducted to determine the effectiveness of combinations of antibiotics when used in the therapy of tick spirochetoses. Two strains of spirochetoses were used in the experiments: Central Asiatic and Dagestan. Fourteen combinations of antibiotics were applied to determine the combinations most effective in the therapy of the disease. All the antibiotics were dissolved in physiological salt solution and administered subcutaneously. The course of therapy continued for a period of 6 days. The experiments established that the combinations of antibiotics most effective in the therapy of spirochetoses were penicillin with streptomycin, penicillin with chlortetracycline, penicillin with actinoidine and chlortetracycline with actinoidine. An antagonistic effect was exhibited by combinations of penicillin with albomycin, chlortetracycline with streptomycin, chlortetracycline with levomycetin, chlortetracycline with albomycin, streptomycin with levomycin, albomycin with actinoidine, albomycin with levomycetin, albomycin with streptomycin, actinoidine with levomycin, and actinoidine with streptomycin.

79. Therapy of Listerellosis With Antibiotics

"Effect of Antibiotics on the Causative Agent of Listerellosis," by M. K. Shcheglova, Chair of Microbiology, Saratov Medical Institute; Moscow, Antibiotiki, Vol IV, No 2, Mar/Apr 59, pp 53-57

Investigations were conducted to determine the effect of penicillin, streptomycin, levomycetin, and chlortetracycline on the causative agent of listerellosis, as well as the effectiveness of combinations of some of these antibiotics when used in the therapy of experimental listerella infections in white mice. Strains of listeria isolated from animals and humans were utilized in the experiments. It was established that chlortetracycline was the most effective antibiotic in the therapy of experimental listerellosis in white mice; that combinations of streptomycin and penicillin, and penicillin with levomycetin were somewhat less effective than chlortetracycline in the therapy of the disease; and that the basis of the therapeutic action of chlortetracycline is the great role which it plays in activating the protective functions of the macroorganisms, in addition to its bacteriostatic effect on the causative agent of the disease.

80. Therapy of Pertusis With Antibiotics of Tetracycline Series

"Histological Investigation of the Effectiveness of the Action of Antibiotics of the Tetracycline Series in Experimental Pertusis Infection," by B. M. Nemirovskaya, Chair of Microbiology, Central Institute for the Advanced Training of Physicians; Moscow, Antibiotiki, Vol IV, No 2, Mar/Apr 59, pp 97-100

On the basis of experiments conducted on white mice, it was established that antibiotics of the tetracycline series, whether administered separately or in combination with ecmolin, were highly effective in the therapy of pertusis; that best results were obtained by the application of chlortetracycline in combination with ecmolin, or chlortetracycline alone; that the results were somewhat less effective when tetracycline was used; and that oxytetracycline proved to be least effective when used in the therapy of pertusis.

81. Experimental Therapy of Bronchial Asthma

"Experimental Therapy of Bronchial Spasms Caused by Anticholinesterase Substances, and the Search of Medicinal Preparations for the Therapy of Bronchial Asthma," by Ye. P. Uspenskaya and L. G. Magazanik, V sb.: Khimiya i Primeniye fosfoorgan. soyedineniy (Chemistry and the Application of Organophosphorus Compounds), M. AN SSSR, 1957, 356-365 (from Referativnyy Zhurnal--Biologiya, No 20, 25 Oct 58, abstract No 94236)

CPYRGHT

"Investigations were conducted on the effect of the preparations of the pentaphen group, diphazine [diethylaminoacetyl-N-phenolthiazine, Khimiya i Primeniye Fosfoorgan. Soyedineniy, by Ye. P. Uspenskaya and L. G. Magazanik, Moscow, 1957, p 358] group, alphamethyldiphazine group, diethylamino acetyldiphenylamide group, and the arpenal group on bronchial spasms produced in cats by proserine. It was noted that the iodoalkylates containing a tetravalent nitrogen atom possess more expressed therapeutic and prophylactic action than do the hydrochlorides with a trivalent nitrogen atom. Of the preparations with a ternary nitrogen atom, arpenal and pentaphen were the most effective; of those with quaternary nitrogen--the iodomethylates of arpenal and pentaphen. Pentaphen is the only preparation which has as yet been clinically tested. With a dose of 0.5 grams administered two to four times a day for a period of one week to 2 months it was found to be adequately effective in bronchial asthma."

82. Use of Preserved Parietal Peritoneum of Cattle in Treating Thermal Burns

"Six Year Experience of Using Preserved Parietal Peritoneum of Cattle in Treating Thermal Burns," by Prof P. P. Khokhlov, and A. D. Shilyayev, Clinic of Hospital Surgery, Karaganda Medical Institute; Moscow, Ortopediya, Travmatologiya, i Protezirovaniye, No 4, Apr 59, pp 39-44

Research on animals, and clinical observations of 740 patients with second and third degree burns proved that the preserved parietal peritoneum of cattle is a valuable therapeutic tissue in treating thermal burns: because the peritoneum creates favorable conditions for the full regeneration of burned tissue, and shortens the period of recovery considerably. The method simplifies the management of the burn victims, and decreases plasmorrhaxis and the ensuing dehydration. The method is simple and safe, and the material is cheap and readily available.

83. Tranquillizing Drugs Used in Therapy of Nervous Diseases

"New Preparations for the Therapy of Diseases of the Central Nervous System," by S. S. Liberman and M. D. Mashkovskiy, All-Union Scientific-Research Chemico-Pharmaceutical Institute imeni S. Ordzhonikidze; Moscow, Meditinskaya Promyshlennost SSSR, Vol XIII, No 2, Feb 59, pp 3-10 and No 3, Mar 59, pp 6-13

The article lists a number of drugs which have a tranquilizing effect on the central nervous system that have been developed in recent years. Although differing chemically, these drugs have common pharmaceutical properties, among them the ability to reduce anxiety and tension in psychic patients and to decrease muscular tonus. In proper doses, they act as somnifacients. Various authors have ascribed to these drugs different names: neuroplegics, centroleptics, neuroleptics, psycholeptics, psychosedatives, ataractics, and tranquilizers. On the basis of their chemical structures, the drugs may be divided into the following groups: the aminazine group; the reserpine group; the diphenylmethane group; propanol derivatives; derivatives of unsaturated tertiary alcohols; and other compounds of various chemical structures.

Aminazine, also known under the names of largactil and chlorpromazine, is the more important preparation of the aminazine group. Pharmacological investigations have established that aminazine is a sedative, enhances the effect of somnifacient, anesthetizing, and analgesic drugs, lowers body temperature, reduces capillary permeability, and acts as an adrenolytic. Aminazine, however, produces some side reactions in certain cases, and in searching for drugs with a therapeutic action similar to that of aminazine but without its side reactions, a large number of preparations have been synthesized, among them promazine which is known in the USSR under the name of propazine; plegicil; vesprine; mopazine; nozinan; trilafo; compazine; stelazine; pacatal; mepazine-- a preparation analogous to pacatal and synthesized at the Institute of Pharmacology, Academy of Medical Sciences USSR; dominal; propilazine; and trophanil.

Reserpine, a natural alkaloid obtained from the leaves and roots of *Rauwolfia serpentina*, is used as a sedative and therapeutic agent in neuropsychiatry. It is also known for its ability to lower blood pressure. It is not as effective as aminazine and occasionally produces symptoms of parkinsonism. Two other *Rauwolfia* alkaloids, recalescine and rescinnamine, are also used as sedatives and hypotensives. It should be noted, however, that they are less effective than reserpine.

Diphenylmethane derivatives are used as tranquilizers in certain forms of psychoneurosis and neurosis. Chemically and pharmacologically they are close to antihistamine preparations. Clvatix, atorax, benactyzine, frenquell, and piridrol are also mentioned.

Some derivatives of propanol are used as tranquilizers. These preparations experimentally exhibited considerable antispasmodic action in cases of spasms induced by strychnine and corazole; they did not effect the vegetative nervous system. These drugs include myanesin known also as mephenesin; miltown; neuroton--a glycerin ester of guaiacol; phenaglycodol also known as ultran; and prenderol.

A number of compounds used as tranquilizers, somnifacients, and antispasmodics are among the derivatives of the saturated tertiary alcohols--the preparations of the fifth group. These include: oblivon known also as methylpentynol; valamin known also as cyclohexanol; dolocental --1-ethynyl-cyclohexyl-allophanate, and ropocal.

A number of compounds differing in their chemical structure but possessing similar pharmacological properties are used as tranquilizers. Among them are: diphenazine, nostyn, and some derivatives of 1-ethyl-3-phenyl pyrrolidine, 1-methyl-4-phenyl piperazine, and 3-diphenyl- Δ^1 -pyrroline.

Tables of the drugs with their chemical formulas are included in the text.

Oncology

84. Chinese Cancer Research

"China's Western-Style and Traditional Medical Circles March Against Tumors," by Hu Ching-hsiang (胡正祥); Feiping, Chung-hua Nei-k'o Tsa-chih (Chinese Journal of Internal Medicine), Vol 7, No 4, 1959, -- 368-376

This item reviews the state of China's anticancer program which includes surveys, research, prophylaxis and treatment. The following information is given:

A uterine cancer detection program was launched in Peiping in August 1958. Other cities such as Shanghai and Ch'eng-tu have also initiated similar cancer surveys.

To aid cancer research, the Chinese Academy of Medical Sciences has compiled a statistical analysis of over 27,000 carcinoma cases diagnosed during the past 40 years. A statistical analysis of over 40,000 tumors found among 220,000 biopsies has been compiled by the First Medical College of Shanghai.

Since the fall of 1958 many hospitals in China have administered Chinese traditional therapy and drugs for cancer and tumors. It has been found that acupuncture therapy lessens the severity of symptoms in most cases of cancer of the esophagus and the uterus. Several traditional drugs are being investigated for their effectiveness in the treatment of certain types of malignancies.

The Peking Tumor Hospital put into operation China's first cobalt gun in 1958. Now hospitals in Shanghai, Canton Tientsin, Wuhan, and Nan-ch'ang also have the equipment.

The Institutes of Experimental Medicine and of Materia Medica of the Chinese Academy of Medical Sciences tested in vivo 153 traditional compounds and 88 samples for effect against cancer. Eight were found to be carcinostatic to 50 percent of animal tumors and are being tried clinically.

Research on actinomycin K at the Institute of Materia Medica of the Chinese Academy of Medical Sciences is now in the stage of clinical experimentation. The Institute of Antibiotics of the same academy has also discovered an antibiotic which inhibits the growth of cancer cells in experimental animals.

The Department of Biochemistry of the Institute of Experimental Medicine, Chinese Academy of Medical Sciences, has done work on serotherapy for experimental tumors. Using Ehrlich's ascitic mouse tumors, the department has succeeded in extracting a rather pure antigen which elicits the formation of antibodies. Cancer immune serum prepared by the department has demonstrated therapeutic effect on carcinomas and sarcomas. The effect is most noticeable in early carcinomas.

In the Department of Experimental Morphology of the Institute of Experimental Medicine, Chinese Academy of Medical Sciences, human malignancies such as fibrosarcoma, fibrosarcoma, and esophageal carcinoma were transplanted in white mice and have been grown to the third generation. As yet no stable strain has been attained. The same department has prepared 125 in vitro tissue cultures of various types of human tumors--fibrosarcomas have been passaged 11 generations and chondrosarcomas four generations. But the tissue culture of epithelial cancer has not been successful.

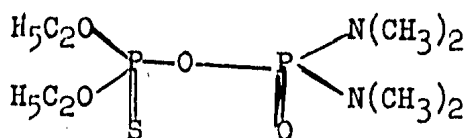
At the Institute of Experimental Biology of the Academia Sinica, Shanghai, the passaging of human fibrosarcoma in white mice has been successful through the third generation.

"Because of the Party's interest in the prevention and treatment of tumors," a tumor hospital with modern equipment has been established in Peiping, an institute for tumor research has been set up in Shanghai, and Committees for Tumor Research have been organized in Peiping, Shanghai, Tientsin, and other localities.

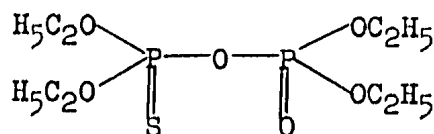
Preparation

Formula

A--5



A--21



"The substances tested reduce the activity of cholinesterase and stimulate the cholinoreactive systems. A--1 and A--21 produce a strong and protracted myotic effect and are recommended for clinical testing in eye diseases. All the preparations cause a rise in intestinal peristalsis. A--5 and A--21 are recommended for clinical testing in cases involving pareses and paralyzes of the intestines. The ability of the liver to render A-21 harmless was established; A--15, to the contrary, is activated by the liver. The introduction of the amido group into the pyrophosphate molecule reduces toxicity and slows cholinergic action. The introduction of a sulfur atom also reduces toxicity. Atropine in combination with artificial respiration and thiopental anesthesia can be successfully applied in intoxications by the above-mentioned preparations."

86. Toxicity of Ditilin in Combination With Organophosphorus Compounds

"The Effect of Ditilin When Used in Combination With Organophosphorus Compounds," by A. V. Miron, Sb. nauchn. stud. rabot. Minskiy med. in-t (Collection of Students' Scientific Works, Minsk Medical Institute), 1957, 2, 110-116 (from Referativnyy Zhurnal -- Khimiya, Biologicheskaya Khimiya, No 8, 25 Apr 59, abstract No 10566)

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"Cholinesterase inhibitors intensify the action of ditilin [the diiodomethylate of the dimethylaminoethyl ester of succinic acid, Lekarstvennyye Sredstva, by M. D. Mashkovskiy, Moscow, Medgiz, 1957, pp 155-156]. Preparation No 11 a derivative of thiophosphoric acid) when used in combination with ditilin increases the toxicity of the latter. The LD₅₀ of ditilin when subcutaneously administered to white mice is 8.3 milligrams per kilogram body of weight. Its DL₅₀ when used in conjunction with preparation No 11 is 3.8 milligrams per killogram of body weight."

87. Chinoparine--a New Spasmolytic

"Pharmacology of a New Spasmolytic Drug," by L. Gyorgy, L. Borbely, M. Kertesz, and T. Somkuti, with the Technical Assistance of Ye. Seress, Institute of Pharmacology, Medical University, Budapest; Budapest, Acta Physiologica Academiae Scientiarum Hungaricae, Vol XV, No 2, 1959, pp 189-199

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"A new papaverine-analogue synthesized by the Chinoin Laboratories has been investigated. The compound known chemically as 1-(3'-4'-dimethoxyphenyl)-6-7-dimethoxy isoquinoline bears the proprietary name of Chinoparine.

"Chinoparine displayed spasmolytic activity identical with that of papaverine when tested on the coronary flow of the isolated heart of a cat, the excized lung of a guinea pig, the intestine of a cat in situ, and the uterus of a rat in situ. Chinoparine decreased blood pressure 30 percent more than papaverine. Venous pressure was not affected by chinoparine, while it was markedly elevated by papaverine. The impairing effect on the heart of a cat in situ, as measured by means of a Henderson type cardiometer, was considerably greater with papaverine than with chinoparine. Chinoparine proved to be half as toxic as papaverine when administered to rats intraperitoneally, and 2.8 times less toxic when administered intravenously."

88. Effect of Aminazine on the Nervous System

"On the Localization of the Action of Aminazine in Schizophrenic Patients," by K. V. Stroykova, Division of the Pathology of Nervous Functions, Scientific-Research Psychoneurological Institute imeni V. M. Bekhterev, Leningrad; Moscow, Voprosy Nevropatologii i Psikhatrii imeni S. S. Korsakov, Vol LIX, No 4, Apr 59, pp 402-409

The effect of aminazine on conditioned and unconditioned reflexes, and the localization of its action were established in observations which were carried out on schizophrenic patients, predominantly those with depression symptoms. Aminazine was administered to the patients in doses of 25, 50, 75 milligrams. Investigations were conducted with the help of the OCh-3D plethysmograph. The observations established that the degree of the depressing effect of aminazine in the central nervous system depends on the functional condition of the cortex and subcortex; that conditioned reflex activity is depressed in some cases of schizophrenia earlier and with greater intensity than unconditioned reflex activity; and that there is an indication that aminazine acts initially on the cortical cells.

The experimental data obtained point to disturbed respiration caused by the effect of aminazine on the already inhibited subcortex, and care is indicated in prescribing dosages.

89. Effect of Aminazine on Conditioned Motor-Defensive Reflexes

"Effect of Aminazine on Some Components of the Conditioned Motor-Defensive Reactions," by B. B. Voznesenskiy, Chair of Pathological Physiology, First Moscow Medical Institute imeni I. M. Sechenov; Moscow, Zhurnal Vysshey Nervnoy Deyatelnosti imeni I. P. Pavlov, Vol IX, No 2, Mar/Apr 59, pp 269-276

Description and results of experiments which were conducted on dogs to determine the effect of aminazine on different somatic and vegetative components of conditioned motor-defensive reflexes, with consideration for the individual characteristics of the animals, are given. Aminazine was administered to the animals intravenously in doses of one milligram per kilogram body weight 15 to 25 minutes before the beginning of the experiment. The experiments established:

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"1. Aminazine in a dose of one milligram per kilogram body weight has an inhibiting effect on the motor, respiratory, and cardiovascular components of conditioned motor-defensive reflexes, with its greatest effect being exhibited in relation to the motor-defensive reflexes.

"2. The effectiveness of aminazine depends on the initial functional condition of the organs and systems which take part in the formation of the defensive reaction as a whole, as well as on the individual characteristics of the animal organism.

"3. Aminazine has the ability to decrease or completely suppress modifications in blood circulation--hypertension, tachycardia, sinus arrhythmia-- caused by a given situation.

"4. There is a direct relationship between the degree with which aminazine inhibits conditioned motor reflexes and the degree with which it suppresses hypertension and tachycardia induced by some situation.

"5. The removal by aminazine, a drug which possesses sympathicolytic properties, of conditioned hypertensive, tachycardiac, and motor reflexes indicates that the origin of these reflexes is, to a large degree, connected with a rise in the adrenergic processes in the central vegetative ganglia."

90. Effect of Aminazine on Conditioned Reflex Activity

"Effect of Aminazine on Conditioned Reflex Activity in Healthy Dogs and in Dogs Affected With Hypertension," by G. S. Gvishiani, Chair of Pharmacology of the Tbilisi Medical Institute and the Pharmacological Laboratory of the Institute of Cardiology, Academy of Sciences Georgian SSR; Moscow, Zhurnal Vysshey Nervnoy Deyatelnosti imeni I. P. Pavlov, Vol 1X, No 2, Mar/Apr 59, pp 277-283

CPYRGHT The article reports the results of experiments which were conducted on dogs to determine the effect of aminazine on the higher nervous functions of healthy dogs, and dogs affected with a cerebral form of experimental hypertension. A bell and an electric light bulb were used to develop a system of conditioned reflexes in the dogs. The cerebral form of hypertension was developed in the animals by means of altering the negative and positive conditioned reflexes in the course of 3 days, and inflicting a strong cutaneous pain on the fourth day. Aminazine was intramuscularly administered in different doses a half, one, and 2 hours before the beginning of the experiment. The conclusions arrived at from the experiments were as follows:

"1. Cerebral irritability was decreased by aminazine, the degree of the decrease varying with the dose of the drug administered, and the initial level of conditioned reflex activity.

"2. Small doses of aminazine--0.2 to 0.5 milligrams per kilogram of body weight administered intramuscularly for a period of 5 consecutive days--reduced the value of the positive conditioned reflexes in healthy dogs. In dogs affected with hypertension these doses improved differentiation, and accelerated the development of extinguishing inhibition.

3. Comparatively large doses of aminazine -- one milligram per kilogram of body weight-- disturbed conditioned reflex activity, reducing, at the same time, blood pressure and body temperature.

Effect of Chlorpromazine on Animal Organism

"Effect of Chlorpromazine (Largactil) on Metabolism and Body Temperature," by G. Fezst, F. M. Mozes, Sz. P. Erdel, A. Berczi, Rev. med (RPR) (Rumania), 1957, 3, No 4, 28-34 (from Referativnyy Zhurnal -- Biologiya, No 20, 25 Oct 58, abstract No 94157, by E. M. Sheynbaum)

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"Largactil (I) was subcutaneously administered to rats in doses of 25 milligrams per kilogram of body weight. Their rectal temperatures in external temperatures of 10, 20, 28, and 38 degrees and their O₂ consumption were then determined. Some of the animals received (I) in combination

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with 5 milligrams per kilogram of body weight of benzedrine (II), and 40 to 50 milligrams per kilograms of body weight of pentazole (III). By depressing thermoregulation, largactil can produce hypothermia as well as hyperthermia, depending on the external temperature. At an external temperature equal to that of the body, (I) may produce a state of hypothermia in the animals which is higher than that in control animals, and frequently causes their death. The decrease in metabolism is not constant and is not proportional to the hypothermic effect produced by (I). The O₂ consumption was determined 48 times within 2 to 3 hours after the administration of (I). In 27 cases it was found to be reduced, in 14 cases increased, and in seven cases a two-phase effect was noted. The rise in metabolism caused by (II) diminished with the simultaneous administration of (I). At a temperature of 28 degrees, (II) blocked the hypothermic effect of (I). The combined application of (I) and (III) increased O₂ consumption. The administration of (III) and other analeptics during therapy with (I) is not recommended. The bibliography contains 28 references."

92. Effect of Largactil on Renal Functions

"Effect of Largactil on Renal Functions as Determined in the Study of Endogenic Creatinine Clearance," by Konstanty Markiewicz, Polski tygod. lekar. (Poland), 1958, 13, No 20, 751-752 (from Referativnyy Zhurnal -- Khimiya, Biologicheskaya Khimiya, No 5, 10 Mar 59, abstract No 6130, by the author)

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"An increase in the glomerular filtrate was noted in most of the patients following the oral administration of largactil. In some cases of hypertonia (second stage) a decrease in the filtrate was observed."

93. Effect of Meprobamate on Blood and Glands

"Investigation of the Effect of Meprobamate -- a Ganglioblocking Preparation (at the Thalamus Level)-- on the Blood Picture and Glands of Internal Secretion," by L. Iancu, V. Sahleanu, R. Holban, Al. Bojinescu, C. Petrescu, Studii si cercetari endocrinol. Acad. RPR (Rumania), 1957, 8, No 4, 470-473 (from Referativnyy Zhurnal-Biologiya, No 20, 25 Oct 58, abstract No 94144, by E. M. Sheynbaum)

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"Meprobamate produces an interneural block at the thalamus level without affecting the peripheral nerves and the vegetative nervous system, and without modifying the reaction of animals to acetylcholine, adrenalin, and histamine. The toxicity of meprobamate is one fifth of that of barbiturates. Meprobamate was administered to rats daily by mouth in doses of 40 miligrams for a period of 15 days. No modifications in the white blood and a considerable rise in the content of reticulocytes (4.6 percent against 1.79 percent in control) under the influence of meprobamate were noted. Basic metabolism decreased by 15.4 percent

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as compared with the normal level. Fixation of I^{131} in the thyroid gland decreased. Meprobamate did not affect the fixation of P^{32} in the thyroid gland and caused no histological and histofunctional changes in the endocrine organs."

94. Investigation of the Effect of Dichlorbutene on an Organism

"Effect of Dichlorbutene on Some Phases of Carbohydrate Metabolism, on the Morphological Composition of the Peripheral Blood, and on Different Animal Organs When Affected by the Poison by Way of Inhalation or by Skin Contact," by V. Ye. Khmeyan, Chair of Labor Hygiene, Yerevan Medical Institute; Yerevan, Izvestiya Akademii Nauk Armyanskoy SSR, Vol XII, No 3, Mar 59, pp 85-94

Eight dogs were used in experiments which were conducted to determine the effect of dichlorbutene, a substance derived in the process of the production of synthetic rubber from acetylene. The animals received the poison by inhalation in concentrations of 0.5 milligrams per liter, 0.25 milligrams per liter, and 0.1 milligrams per liter. Two of the dogs were exposed to the action of the poison by direct skin contact. Quantitative changes in the glucose and pyruvic acid content in the blood were used as criteria for determining of the effect of dichlorbutene on carbohydrate metabolism. On the basis of the experiments the author concluded:

"1. Dichloro-1,3-butene -2 is highly toxic to the animal organism, producing a noticeable change in the amounts of glucose and pyruvic acid in the blood.

"2. An increase in the number of leukocytes in the peripheral blood of the animals was observed in the initial period of intoxication caused by the poison. A simultaneous qualitative change in the white blood was noted. Modifications of the erythrocytes were observed in the final stages of chronic intoxication.

"3. The effect of the poison when applied to the broken skin was similar to that produced by inhalation. Changes in the organs and systems of the organism were observed as a result of intoxication by dichlorbutene regardless of whether the poison was absorbed through the broken skin or entered the organism by inhalation."

The experiments and observations led to the conclusion that exposure to dichlorbutene is an occupational hazard and that steps should be taken to protect the workers from the effects of the poison.

95. Effect of Phenamine on the Olfactory Sense

"Artificial Intensification of the Olfactory Sense in Service Dogs," by L. V. Krushinskiy and D. A. Fless, Laboratory of Pathophysiology, Chair of the Physiology of the Higher Nervous Functions, Moscow State University imeni M. V. Lomonosov; Moscow, Zhurnal Vysshey Nervnoy Deyatel'nosti imeni I. P. Pavlov, Vol IX, No 2, Mar/Apr 59, pp 284-290

A report on the results of experiments in which phenamine was administered to dogs in order to intensify their sense of smell is presented. The experiments established that phenamine in optimal doses of 0.01 to 0.02 grams intensifies the sense of smell; that it is effective within 30 to 40 minutes after its administration, with its action continuing for a period of several hours; when administered daily for a protracted period of time, it tends to reduce the acuteness of the olfactory sense; and that the combined administration of phenamine with caffeine intensifies the sense of smell to a greater degree than does phenamine itself.

Physiology

96. Research on Vibration Sickness Reported

"The First All-Union Conference on Vibration Control," by
V. P. Kamchatnov; Kazan, Kazanskiy Meditsinskiy Zhurnal,
No 1, Jan/Feb 59, pp 92-93

Describes the discussions and reports read at the first All-Union Conference on Vibration Control, held in July 1958 in Leningrad. Reports were read on the subject of vibration sickness and ways of alleviating the injurious effects of vibration. The author of this article states that the problem of vibration control is becoming more significant not only in the expanding of the petroleum industry, but also in other expanding industrial enterprises. This has created new problems for physicians specializing in occupational pathology.

Ye. Ts. Andreyeva-Galanina (Leningrad) read a report on the first day of the conference entitled, "The Status of the Problem of the Effects of Vibration on the Organism." She pointed out that there are two main symptoms of vibration sickness: vascular spasm and change in vibration sensitivity. These symptoms have been observed in illness caused by both high and low frequency vibrations. The pneumatic drills now in use should be redesigned to suit various types of work. She also suggested that a need exists for standardizing industrial vibrations and defining the permissible limits in order to formulate preventive measures.

A. V. Grinberg (Leningrad) gave an illustrated talk on the effects of vibration caused by machines, instruments, and equipment on changes in bone tissue and joints. He stated that that early diagnosis of the damage done to bone tissue and joints must be based on skilled X-ray examinations. In the course of the periodic medical examination of workers, therefore, it is expedient to have an X-ray examination of those joints which are subjected to the greatest stress during work. He suggested that a course in X-ray examination of joints be made a part of the training program in the state institutes for the advanced training of physicians (GIDUV).

E. A. Drogichina and N. B. Metlina (Moscow) read a report entitled, "Clinical Course of Vibration Sickness resulting from High Frequency Vibration." They referred to new data dealing with peculiarities of the clinical syndrome of vibration sickness caused by pneumatic equipment having a high degree of recoil, and of pathological processes caused by other industrial factors.

Reports of V. G. Artamova (Leningrad) and B. A. Shtekhan (Baku) suggested a rational solution of the problem of physical fitness as well as new methods for the treatment and prevention of vibration sickness caused by pneumatic cutting tools.

N. Klishin (Novosibirsk) proposed that pneumatic drills which utilize a new cycle be used to reduce recoil and thereby improve the working conditions. In this, he found support among engineers and technical workers.

A. I. Kovalenko (Leningrad) spoke on the subject of "Characteristics of Recoil and Vibration in Pneumatic Drills." Yu. A. Agashin and L. N. Gratsianskaya read a report on: "A Hygienic Evaluation of the Vibration of Boring Hammers used in Mining Rare Earths."

A. F. Lebedeva and V. G. Artamova discussed the effects of vibration on persons working with cutting and engraving drills, and on methods of improving their working conditions. It was pointed out that vibration sickness may occur as a result of the vibration produced by the above-mentioned drills.

L. Ya. Burova (Leningrad) spoke on the nonspecific action of vibration on an organism. She said that the harmful effect of vibrating instruments on the health of workers increases with the length of time they are employed in that work. An increase in the incidence of occupational diseases like vibration sickness and polyneuritis of the upper extremities among foundry workers parallels the number of years a person is employed in that work.

Considerable time was devoted at the conference to the subject of high frequency vibrations. Many reports were read on this subject as well as on the subject of vibration in general.

V. G. Terent'yev, S. S. Markaryan, and Yu. P. Petrov (Scientific Research Testing Institute of Aviation Medicine) stated in their report, "The Effect of General Vertical Vibration on the Nervous System, the audio and Vestibular Apparatus, and visual acuity of a human being," that vibration for a period of between 4 to 8 hours noticeably effects the auditory acuity and causes a varied decrease in visual acuity depending on the amplitude and frequency of vibration. General vertical vibration of considerable force weakens the activity of the cerebral cortex (phase condition, protective inhibition), because it effects the nervous system.

A. M. Mel'kumova (Moscow) read a report entitled: "Peculiarities of Vibration Sickness Symptoms in Workers During the Vibrative Condensation of Concrete." She discussed the effects of general vibration in industrial establishments where reinforced concrete items are manufactured. She said that in such industrial establishments the parameters of vibration frequency are usually between 35 and 50 cycles and between 60 and 100 cycles, and the amplitude between 0.1 mm and 1.3 mm and between 0.5 mm and 0.8 mm. Vibration in these such plants effects the nervous system primarily and the morbid condition is localized in the cerebrum and spinal cord.

R. Ya. Maksimiv (Moscow) discussed change over from soft to hard mixtures of reinforced concrete. Workers in such factories are supplied with special footwear which absorb vibration. He thinks that use of heat-insulating handles is very beneficial not only because they reduce the force of vibration, but because they also serve as protection against the adverse effects of cold.

Reports and discussions at the First All-Union Conference on Vibration Control showed that practicing physicians and engineers must make use of new discoveries which are useful in alleviating vibration sickness.

97. Nitrogen Under High Pressure Affects Spinal Reflex

"Effect of Nitrogen Under High Pressure on the Activity of Spinal Reflexes," by Chang Ch'un, Chair of Physiology, Military Medical Academy of the Order of Lenin imeni S. M. Kirov; Leningrad, Fiz-iologicheskii Zhurnal imeni I. M. Sechenov, No 5, 1959, pp 605-609

The author states that although nitrogen under ordinary conditions is an inert gas and does not exert any effect on the organism whatsoever the gas changes its properties when compressed and has a toxic effect on an organism, causing a narcosis-like condition both in humans and animals. He made a study of spinal reflexes of 26 decerebrated cats in a recompression chamber containing oxygen under high pressure. The results of his experiments with these cats showed that compressed nitrogen (pressure of 9 atmospheres) not only disturbs the spinal cord centers, but also effects the higher branches of the central nervous system (mesencephalon and cerebellum). This disrupts the reflex activity of the spinal cord. He further states that the decrease in the process of inhibition in the spinal cord was more rapid than the decrease in the process of excitation when the pressure of nitrogen was equal to 9 atmospheres.

98. Nitrogen Diffusion Through Human Skin Measured

"Nitrogen Diffusion Through the Human Skin When Breathing Oxygen," by A. P. Brestkin and A. G. Zhironkin, Chair of Physiology, Military Medical Academy of the Order of Lenin imeni S. M. Kirov; Leningrad, Fiziologicheskii Zhurnal imeni I. M. Sechenov, No 5, May 59, pp 597-604

The authors state that the rate of nitrogen diffusion through the skin of an adult man, after he has been breathing oxygen for a long period of time in a special respiration apparatus, increases with increasing temperature. The rate of nitrogen diffusion through the skin also increases with increasing ambient pressure: not directly proportionally, however, but to a lesser degree.

Measurements were performed in a chamber with normal ambient air pressure and with high pressure (2.5 atmospheres absolute) at a temperature of between 17°C and 25°C. A comparison was made between the volume of nitrogen diffused through the skin of a man wearing ordinary clothes and of a man dressed in a rubber overalls inflated with oxygen.

The authors state that determination of the magnitude of nitrogen diffusion through the human skin would help greatly in finding the most rational method of preventing caisson disease. The two authors of this article served as the subjects of the experiments they describe.

A diagram of the apparatus used for determining the rate of nitrogen diffusion from the organism of a man breathing oxygen is given. A diagram of the apparatus for measuring the volume of residual air and dead space in man is also given. Detailed descriptions of both diagrams are given in the text.

Radiology

99. Current Views on Acute Radiation Injuries

"Pathological Physiology of Acute Radiation Sickness (Experimental Material on the Biological Effects of External Ionizing Radiations)," edited by P. D. Gorizontov, Medgiz, 1958, 374 pages; (from Klinicheskaya Meditsina, No 1, Jan 59, p 169)

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"The book presents material useful both to people engaged in experimental work on radiation pathology, and to physicians engaged in various specialties. The book elucidates the problems of the pathological physiology of acute radiation injuries not only as reported in literature, but also presents experimental materials. The most essential problems of acute radiation injuries are presented in the book from the current point of view."

100. Safeguarding Reservoirs from Contamination by Radioactive Wastes

"Sanitary Safeguarding of Open Reservoirs From Contamination by Radioactive Substances," by A. N. Marey, Medgiz, 1958, 89 pages; (from Klinicheskaya Meditsina, No 1, Jan 59, p 168)

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"This book is designed for use by sanitary physicians, and engineering and technical personnel working in the field of rendering radioactive wastes harmless. The book discusses the problems, possibilities, sources, and methods by which different enterprises, laboratories, and institutions using radioactive isotopes may contaminate open reservoirs and soil by radioactive wastes. Methods of sanitary-dosimetric assaying of reservoirs, and certain methods of preventing their contamination by radioactive wastes are presented."

101. Radiation Hyperglycemia Improved by Thiamine and Riboflavine

"The Effect of Thiamine and Riboflavine on the Dynamics of the Glycemic Curve in Rats Subjected by X-Ray Irradiation," by J. Daciulyte, Biol. Inst. Darbai. Liet TSR Mokslu. Akad., (Works of the Institute of Biology, Academy of Sciences, Lit. SSR), 1958, No 3, 255-262 (from Referativnyy Zhurnal -- Khimiya, Biologicheskaya Khimiya, No 7, 10 Apr 59, p 38, Abstract No 8042 by I. Elman)

CPYRGHT

"Irradiated rats with pronounced leukopenia, and hyperglycemia received doses of thiamine, and riboflavine. Neither thiamine, riboflavine, nor their combination prevented leukopenia, but the disappearance of leukopenia was accelerated significantly. Thiamine was much more effective than riboflavine in normalizing the disturbed glyccmic curve which was observed after irradiation. The mixture of these two vitamins was almost ineffective."

Veterinary Medicine

102. New Brucella Suis Strain With Promising Immunization Properties

"Experiments on The Production of Brucella Suis Strains With Attenuated Virulence," by L Prohaszka, Research Institute of Animal Hygiene, Hungarian Academy of Sciences; Budapest, Acta Veterinaria, Vol 9, No 1, 1959, pp 67-72

Repeated ultraviolet irradiation of one virulent Brucella suis strain produced several colonies, one of which -- designated strain E -- has retained its reduced virulence and stable metabolism for more than 2 years.

In experiments on guinea pigs, mice, and pigs, the new strain showed a weaker virulence than the original. Whereas abortions resulted in each case of inoculation with original strain, sows inoculated with the new strain did not abort. Immunization experiments on mice were encouraging, but further tests on sows will be necessary before a practical evaluation of the immunization properties of the new strain can be made.

103. Nutrition Important in Brucellosis Resistance

"The Role of Nutrition in the Resistance of Animals to Brucellosis Infection," by N. F. Bel'kov, S. S. Vikhlyayeva, and V. A. Tsingovatov, Tr. Omskogo Vet. In-ta (Works of the Omsk Veterinary Institute), No 15, 57, pp 101-117 (from Referativnyy Zhurnal Biologii, No 21, 10 Nov 58, abstract No 96995)

CPYRGHT

"It was shown that reactivity and resistance to brucellosis are changed essentially in rabbits as various levels of protein nutrition. Rabbits which are kept on rations with a normal quantity of digestible protein and an average protein ratio showed greater resistance to brucellosis following the subcutaneous introduction of a Br. melitensis culture in comparison with rabbits which were kept on rations with an excess amount of digestible protein and a low protein ratio."

104. Control of Foot and Mouth Disease

"The Experimental Control of Foot and Mouth Disease in Young Agricultural Animals," by Yu. G. Alekperov and I. I. Manafov, Republic Veterinary Bacteriological Laboratory, Azerbaydzhan SSR; Moscow, Veterinariya, Vol 36, No 2, Feb 59, p 41

This article briefly discusses an outbreak of foot and mouth disease, which was confirmed by laboratory investigation, among agricultural animals in 1957. The disease was more severe in young calves and pigs than in mature animals. Methods of eradicating the epidemic are described. Serum and citrated convalescent blood, after being examined for brucellosis, were used for therapeutic and prophylactic purposes.

Results of inoculations showed that 15.5 to 76% of the young animals died of foot and mouth disease before inoculation while only 0.3% died after inoculation with serum or citrated blood. The conclusions presented on the basis of these results are as follows:

CPYRGHT

"1. It is possible to prevent the death of young animals from foot and mouth disease by using serum or convalescent blood."

CPYRGHT

"2. It is better to prepare serum that citrated convalescent blood. Serum can be used up to 6 months after its preparation, whereas citrated blood must be used within 2 or 3 days.

"3. The technology of preparing the serum is simple; it can be prepared in any veterinary-bacteriological laboratory."

105. Immunization Against Hog Cholera

"A New Method of Immunizing Swine Against Cholera," by I. Okuntsov and G. Yepifanov, Siberian Scientific Research Veterinary Institute; Omsk, Sel'skoye Khozyaystvo Sibiri, No 10, Oct 58, pp 69-70

Experiments in which 22 swine were used to test the effectiveness of an intracutaneous and subcutaneous vaccination against cholera are described. Four unvaccinated pigs were used as controls. The experimental animals were divided into three groups and received, respectively: one ml of glycerinized crystal violet vaccine subcutaneously in the tip of the ear; 2 ml, also subcutaneously; and one ml intracutaneously. Two vaccinations were given a week apart.

The control animals were infected subcutaneously with one ml of a production strain of the virus (in a dilution of 1:500) 28 days after the first vaccination; characteristic disease symptoms were observed. All the control pigs died on the 6th-12th day after infection. Post-mortem examination revealed the characteristic changes. One pig from the first and third group and two from the second group of vaccinated animals died. The higher number of deaths in the second group is attributed to individual peculiarities of the inoculated animals.

The same experiment was carried out with varying amounts of vaccine in an Omsk Biofabrik (biological plant). Production strain No 88 was employed for infection. Results were similar to those of the initial experiments.

On the basis of these experiments, 58,827 swine in 8 rayons of Omskaya Oblast were vaccinated subcutaneously by this method with a one ml dose of vaccine. No further cases of hog cholera were reported. The tip of the ear is considered to be a particularly suitable site for vaccination since it contains little subcutaneous cellular tissue and almost no areactive fatty tissue; the vaccine is dispersed slowly, as a result of which the nerve endings are subjected to specific stimulation with antigen for a longer time, which facilitates the production of antibodies and the formation of immunity.

After pointing out the fact that this method of vaccination is more economical, the authors state in conclusion:
CPYRGHT

"The results of our experiments and work on eradicating this disease permit us to conclude that the intracutaneous and subcutaneous vaccination of swine against hog cholera in the tip of the ear with glycerinized crystal violet vaccine in a dose of one ml, twice or once, confers stable immunity. Vaccination of swine by these methods should be recommended for all farms."

106. Lapinized Hog Cholera Vaccine Tested

"Lapinized Vaccine Against Hog Cholera in Experimental and Production Tests," by I. V. Okuntsov and G. F. Yepifanov, Siberian Scientific Research Veterinary Institute; Moscow, Veterinariya, Vol 36, No 2, Feb 59, pp 48-51

A special study conducted in 1957 on the harmlessness and efficacy of lapinized hog cholera vaccine is reported in this article. The rates at which immunity was developed in animals inoculated with the lapinized vaccine alone, with the vaccine and anticholera serum simultaneously, and with the vaccine after the introduction of serum, were investigated. Dry lapinized virus vaccine, Kashintsevskaya Biofabrika, series No 10 (18 March 1957), and antiplague serum, Omsk Biofabrika, series No 40 (17 August 1956) were used for the inoculations.

After testing the lapinized vaccine on several farms and sovkhoses under experimental and production conditions it was possible to draw the following conclusions:
CPYRGHT

"1. Lapinized vaccine administered simultaneously with antiplague serum or without it is harmless to swine of regardless of their age.

"2. The introduction of the lapinized vaccine to swine in doses of more than 2 ml does not cause complications under experimental conditions.

"3. The lapinized vaccine (especially without serum) caused severe reaction and death accompanied by pneumonia and growth retardation in 10.5-29.5% of the piglets, and also aggravated the course of paratyphoid with a high record of fatalities.

CPYRGHT

"4. Infection of hogs with the cholera virus under experimental conditions showed that the best immunization results are obtained when the lapinized vaccine and antiplague serum are introduced simultaneously.

"5. The introduction of antiplague serum 18-25 days before inoculation with lapinized vaccine prevents the development of immunity."

107. Measures for the Control of Fowl Plague

"Note on a Directive Concerning Measures Against Fowl Plague,"
by N. T. Volkov, Belorussian Sovnarkhoz; Moscow, Veterinariya,
Vol 36, No 2, Feb 59, p 62

CPYRGHT

"One hundred thousand fowls are raised and fattened daily in poultry combines. All fowls are vaccinated in order to prevent plague in those susceptible to this disease.

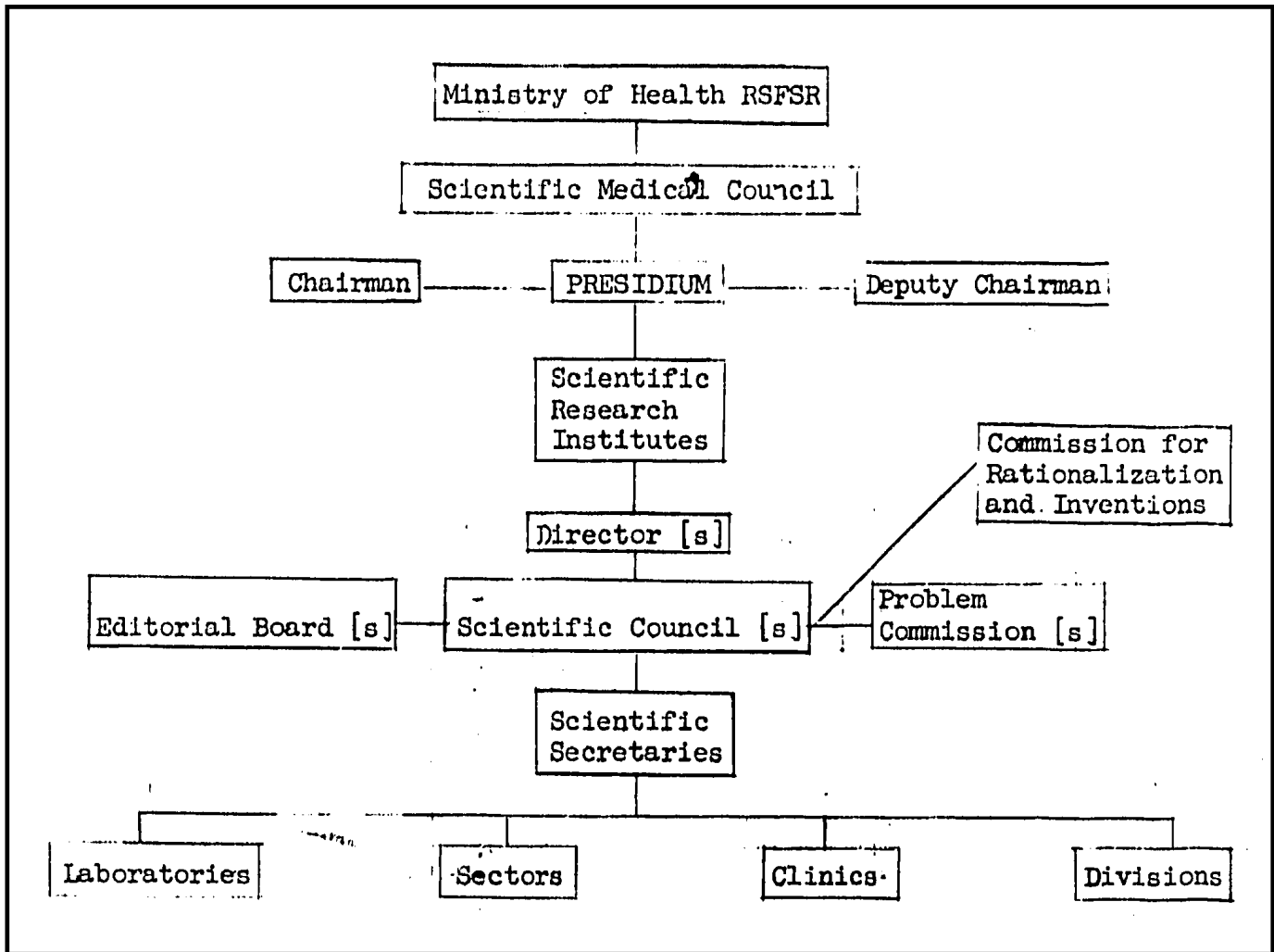
"When plague is detected among fowl brought to a combine, all birds on the combine are killed, and their corpses are boiled (points 3 and 9 of a directive on measures against fowl plague). The directive does not explain how to handle vaccinated fowl. In connection with this, we consider it expedient to modify points 3 and 9 of the directive and suggest the following: With the appearance of plague among a group of birds just entering the combine, only the birds brought in should be killed; birds being fattened, should be vaccinated against plague, and young birds which have been selected for raising on the basis of the absence of plague should be kept isolated with the observance of strict veterinary-sanitary regulations until they are ready for fattening. The corpses of the birds which are killed should be disposed of, and down and feathers disinfected."

Miscellaneous

108. Organizational Breakdown of Medical Research Institutes Under Ministry of Health RSFSR

"In the Scientific Medical Council, Ministry of Health RSFSR,"
by Ye. K. Ponomar'; Moscow, Zdravookhraneniye Rossiyskoy Federatsii, No 5, May 59, pp 45-46

The following chart illustrates the organizational breakdown of scientific research medical, hygiene, pediatric, etc. institutes under the Ministry of Health RSFSR:



The functions of the Scientific Council of a scientific research medical institute include planning scientific research within the scope of the institute; controlling the fulfillment of the plans of the scientific work; supervision over the activities of each division, laboratory, etc. of the institute; introducing into medical practice all new achievements and discoveries of medical science; publishing scientific works, reports, works (trudy), etc., of the institute; the selection of cadres and staff; and the training of cadres. These functions or duties have been standardized for all institutes under the Ministry of Health RSFSR, but not all are carried out by each institute.

Several variations exist in the organizational breakdown of institutes. Not every institute has a Problem Commission, whose main responsibility is planning individual problems and the control over its fulfillment. Not all institutes have a permanent Editorial Board nor a Commission for Rationalization and Inventions.

The Scientific Secretary, whose basic function is to act as the manager of the Scientific Council, receives no extra compensation, and frequently has no academic degree nor even a medical education. The Scientific Council, which is the principal management body of any institute, varies in its number of members. The usual number is around 90, with the majority of members having academic degrees.

109. Report on the Medical and Advanced Training Institutes of the Ministry of Health RSFSR

"Conference of Directors of Vuzes and Institutes for the Advanced Training of Physicians of the Ministry of Health RSFSR," by D. A. Bessalyk and A. I. Yemel'yashenkov; Moscow, Zdravookhraneniye Rossiyskoy Federatsii, No 5, May 59, pp 41-44.

Results of the February 1959 Conference of Directors of Vuzes and Institutes of Advanced Training of Physicians, Ministry of Health RSFSR, which was held in Moscow, indicate that some 10,000 scientific workers are now employed in vuzes (higher educational institutions) and institutes of advanced training of physicians of the Ministry of Health RSFSR. Of this total, 936 have a doctor of sciences degree, and 4,151, a candidate of sciences degree. It has been noted that during the past few years, the number of candidates of sciences degrees has increased over the number of doctor of sciences degrees. As compared to 1957, the number of persons having doctor of sciences degrees has decreased by 16. At present, however, the number of persons with doctor of sciences degrees who head chairs or courses is approximately 52.5% of the total while in 1955 the figure was 51.3%.

The uneven distribution of individuals holding the doctor of sciences degree is indicated in the following: at the First Moscow Medical Institute, there are 71 individuals with a doctor of sciences degree; in the First Leningrad Medical Institute, there are 37; in the Kazan State Medical Institute 30; in the Altay Medical Institute 5; In the Chita Medical School 4, and in the Vladivostok Medical Institute none.

The above disparity is also noted in relation to specific specialties. For example, among the heads of Chairs of Therapy, the number of persons with doctor of sciences degrees comprise 62%, Chairs of Stomatology 52%, Chairs of Pediatrics 46.5%, Chairs of Infectious Diseases, 25%, Chairs of Obstetrics and Gynecology, 87.5%, Chairs of Normal Physiology, 73%, Chairs of Pathological Anatomy, 67%, Chairs of Pharmacology, 35%, etc.

In the not-too-distant future, the number of persons having doctor of sciences degrees will be further decreased through retirement or death, since those over 60 years of age having the doctor of sciences degree comprise 29%, those between 50-60 years comprise 47% and those under 50 comprise only 24%.

One of the basic means for training a scientific-pedagogical cadre in vuzes is the "aspirantura" system. In institutes of the RSFSR during 1956-1958, 805 persons completed the "aspirantura." Of this group only 177, or 22% went into practical work. This indicates that vuzes had apparently spent insufficient attention in the selection of candidates for the "aspirantura."

It was emphasized at the conference, that the number of vacancies for the "aspirantura" had to be greatly increased, since a large percentage of experienced heads of chairs have not yet been given an opportunity to direct the work of aspirants.

V. V. Drofimov recommended at the conference that the scientific council of each institute select qualified youths as candidates for the "aspirantura." Thus, upon completing the institute, the physician would be considered a candidate for the "aspirantura" and would then be sent for a period of two years for practical work in his chosen specialty, and after the completion of that two years, be returned for advanced training in the "aspirantura."

The participants of the conference accepted the proposals for improving the training of the professor-teacher cadre and the reorganization of the higher medical educational system. The Main Administration of Educational Institutions of the Ministry of Health RSFSR, on the basis of these proposals, has developed corresponding measures, part of which have already been put into practice.

110. Third Congress of Ukrainian Neuropathologists and Psychiatrists

(Unsigned announcement); Moscow, Zhurnal Nevropatologii i Psikhiiatrii imeni S. S. Korsakova, No 4, 1959, p 510

CPYRGHT

"The Third Congress of Neuropathologists and Psychiatrists of the Ukrainian SSR will be held in the second half of September 1959 in Khar'kov.

"The program of the congress is: (1) the status of neurological and psychiatric aid to the population and methods for its improvement; (2) vascular pathology of the nervous system, its treatment and prophylaxis; (3) infectious diseases of the nervous system; (4) pathogenesis, diagnosis and treatment of schizophrenia.

"Titles and abstracts of reports should be sent to the following address: Khar'kov, ul. akademika Pavlova, 46, Ukrainskiy Nauchnoissledovatel'skiy Psikhonevrologicheskiy Institute, Nauchnaya Chast'.

"All questions relating to the work of the congress should be directed to the above address."

111. Pharmaceutical Congress in Czechoslovakia

(Unsigned announcement); Moscow, Meditinskaya Promyshlennost'
SSR, No 2, Feb 1959, p 64

CPYRGHT

"The Czechoslovakian Pharmaceutical Society is organizing a pharmaceutical congress to be held 8-11 September 1959 in Karlovy Vary with the participation of Czechoslovak and foreign specialists participating. The congress will be devoted to achievements in research work and in the production and control of medicinal substances and preparations.

"Abstracts and original works in the field of synthesis, analysis, and control of drugs, pharmacognosy, and Galenic pharmacy will be read at the congress.

"The program of the congress will include visits to well-known Western Czechoslovakian resorts, certain pharmaceutical enterprises, and scientific-research institutes in Prague."

VI. METALLURGY

112. High-Temperature Weldments of Steel 1Kh18N9T

"Automatic Welding of Components of Steel 1Kh18N9T Designed for Short Periods of Operation at High Temperatures," by E. Yu. Yuganson, Tallinsk Machine Building Plant "Dvigatel"; Kiev, Avtomaticheskaya Svarka, No 1, Jan 59, pp 53-57

Automatic butt welding of 12-mm-thick plates of steel 1Kh18N9T was performed with 5-mm-diameter Sv-Okh18N9 wire submerged in the high-silicon, manganese flux AN-348A with 5-10% admixtures of an Al-Fe alloy. Low-silicon flux AN-26 (centralized production of this flux for welding of 18-8 type steels has been organized at the Zaporozh'ye Glass Works) was substituted for comparison tests. Joints welded in flux AN-348A (amount of admixture not given) have a tensile strength of approximately 62-63 kg/mm², impact strength of 12-13 kg/cm², and bend angle of 180 degrees. Stabilization annealing at 850°C for 3 hours with cooling in air increases impact strength to 16-17 kg/cm², but holding for 10 hours at 600°C decreases impact strength to 9.2-9.3 kg/cm². Joints welded in flux AN-348A with a 10% admixture exhibited highest corrosion stability after a 6-month emersion period in a solution of 40% H₂SO₄ and 60% HNO₃. Intergranular corrosion was completely absent in seams welded in flux AN-348A with a 3% admixture and boiled in a sulfuric acid-cooper sulfate solution for 140 hours. Joints welded in flux AN-348A with a 10% admixture were 2-2.5 times more scale-resistant than the parent metal in tests at 1,100 to 1,120°C with 4-hour holding periods for a total of 100-120 hours. Titanium oxidation was completely inhibited in welds performed in flux AN-26 with a 5-10% admixture.

113. Combined Automatic Welding of Spherical Vessels

"Combined Automatic Welding of Spherical Vessels," by V. R. Ryabov, Zlatoust Machine Building Plant; Kiev, Avtomaticheskaya Svarka, No 1, Jan 59, pp 87-91

Equipment and operating conditions are described for automatic butt welding of spherical vessels without the use of back-up rings. Hemispheres with welded outlets and 35° bevel edges are clamped together and tack welded at two opposing points with a tungsten wire in an argon-shielded arc. Clamps are then removed and two passes are made with tungsten electrode to form the weld root. Good bead quality of the inner surface of the weld is obtained by supplying argon into the sphere at a rate not exceeding 5 liters

per minute. After tempering and X-ray examination, weld seam is completed by submerged welding (electrode not indicated). Electrode wire Sv-18KhMA is applied in welding spheres of steel 25KhGSNZA in flux AN-348A. After quenching and tempering, weld seams have a tensile strength of 100 kg/mm² and bend angle not exceeding 40 degrees.

114. Properties of Five Titanium Base Ternary Alloys

"Principles in the Change of Mechanical and Technological Properties of Ternary Alloys on a Titanium Base," by L. P. Luzhnikov, Candidate of Technical Sciences, and Engr V. M. Novikova; Moscow, Metallovedeniye i Termicheskaya Obrabotka Metallov, No 3, Mar 59, pp 6-13

Detailed studies are presented of the mechanical and technological properties and weldability of titanium base alloys of the Ti-Al-Mo, Ti-Al-Cr, Ti-Al-Mn, Ti-Al-Fe, and Ti-Fe-Mn systems. High heat resistance, technological ductility, and weldability are exhibited by Ti-Al alloys alloyed with β -stabilizers in limits approaching maximum solubility of the stabilizers in α -titanium.

115. Accelerated Heating for High Quality, High-Temperature Forgings

"Accelerated Heating of High Alloy, Stainless, and Heat-Resistant Alloys for Hammer and Pressure Forging," by M. M. Il'in and T. A. Mikhin; Moscow, Kuznechno-Shtampovochnoye Proizvodstvo, No 4, Apr 59, pp 29-32

Large cold blanks of heat-resistant, low-heat-conducting steel EI481 and alloy EI437B were placed 75 mm apart in a flame furnace heated to forging temperature for the blanks. The following forced heating was controlled so that furnace gas temperatures did not exceed 1,180°C. The identical procedure was followed for cylindrical blanks (diameters up to 300 mm) of the same two materials with thermocouples screwed in at the center and near the surface of the blanks. The blanks were warmed through in 90 minutes and showed a 30-degree difference in temperatures at the center and surface. After a 30-minute holding period, the blanks were forged and heat treated. Forgings showed no thermal cracking and more uniform structural and mechanical properties than those from the usual long heating process (no data given). Additional accelerated heating tests were performed on disks of high-alloy, high-temperature steels EI388, EI395, and EI434 and the nickel base alloy EI435 employing induction coils. No cracking was observed in these disks (thermal stresses

in such a process are analogous to those encountered in starting jet engines). The authors concluded that application of accelerated heating of high alloys for hammer and press forging is possible independent of the thermal conductivity of the alloys if their ductility as determined by the elongation at rupture of specimens cut from centers of blanks is higher than their coefficient of linear expansion.

116. Effect of Alloying on Hardness of High-Temperature Austenitic Alloys

"Effect of Alloying on the Hardening and Softening of High-Temperature Alloys on an Iron Base," by Engr D. F. Zhirnov; Moscow, Metallovedeniye i Termicheskaya Obrabotka Metallov, No 3, Mar 59, pp 17-19

Hardness tests and microstructural analyses were conducted on experimental alloys on an iron base (13% Cr, 8% Ni, and 8% Mn) alloyed individually with 0-0.6% C, 0-0.4% V, 0-1.4% Al, 0-5% Mo, 0-8% W, and 0-2.8% Nb with particular emphasis on recrystallization study. Cylindrical specimens (18-mm length, 12-mm diameter) of these alloys were subjected to 50% reduction and then heated to temperatures up to 1,000°C for 5 hours. Recrystallization begins in specimens containing 4.52% W annealed at 800°C and is completed in those annealed at 850°C. Coalescent recrystallization appears in annealing at 900 to 950°C and proceeds rapidly at 950 to 1,000°C. Carbon, molybdenum, vanadium, aluminum, and niobium have a respectively decreasing effect on retardation of crystallization. Long-term tests of specimens of the basic alloy and the same alloy with vanadium, molybdenum, and tungsten (2% by atomic weight) showed a progressive increase in heat resistance (10, 30, 50, and 100 hours respectively before rupture).

117. Weak Ferromagnetism

"On the Contribution of Weak Ferromagnetism," by Ye. A. Turov, Institute of Physics of Metals; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 4, Apr 59, pp 1254-1258

A number of properties of weak ferromagnetics at low temperatures are investigated from the viewpoint of Dzyaloshinsky's theory, which considers weak ferromagnetism as a simple consequence of magnetic symmetry of antiferromagnetic crystals of a definite magnetic structure. Cases of "transverse" and "longitudinal" weak ferromagnetism are considered (in the first case the spontaneous magnetic moment is perpendicular and in the second parallel to the antiferromagnetism axis). The spin wave energy, temperature dependence of the magnetization, and the spin part of the thermal capacity have been computed.

118. Parameters of Transition Metals

"On the Connection Between Structural and Magnetic Parameters of the Transition Metals." by F. M. Gal'perin, Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 4, Apr 59, pp 1212-1223

The connection between the structural parameters (lattice type, interatomic distances, coordinational number, etc.) and the magnetic parameters (atomic magnetic moment, the Curie point, and Curie constant) is considered for pure transition elements Cr, Mn, Fe, Co, Ni, as well as for a number of their ferromagnetic ordered alloys and chemical compounds. Semiempirical quantitative relations expressing this connection are proposed. With the aid of these relations and of the available experimental data on the crystal and electronic structures of metals, the magnetic parameters are computed and found to be in good agreement with the experiments.

119. Impurities in Transition Metals

"On the Influence of Impurities on X-Ray Spectra of Transition Metals," by I. B. Borovskiy and K. P. Gurov, Institute of Metallurgy, Academy of Sciences USSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 4, Apr 59, pp 1203-1206

A method is proposed which permits estimation of the effect of impurities on the parameters of the transition metal X-ray emission spectra. The method is applied to the case of diluted alpha-solid solutions with iron as the base.

[For additional information on metallurgy, see I, Industrial Chemistry and Inorganic Chemistry.]

VII. PHYSICS

Atomic and Molecular Physics

120. Distribution of Light in Scattering Medium Studied

"Point Source of Light Radiation in a Scattering Medium,"
by L. A. Galin, Moscow; Moscow, Prikladnaya Matematika i
Mekhanika, Vol 23, No 2, Mar/Apr 59, pp 299-304

The distribution of light radiation from a point source in a scattering medium is determined. It is assumed that the scattering is isotropic in the sense that an element of the medium radiates with equal intensity in all directions. Similarity with problems in neutron diffusion is noted.

Cosmic Rays

121. Energy Flux of Air Showers

"Spatial Distribution of the Energy Flux of the Electron-Photon Component of Extensive Air Showers," by V. A. Dmitriyev, G. V. Kulikov, Ye. I. Massal'skiy, and G. B. Khristiansen, Institute of Nuclear Physics, Moscow State University, Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 4, Apr 59, pp 992-1,000

Data are presented on the spatial distribution of the energy flux of the electron-photon component of extensive air showers possessing $1 \cdot 10^4$ - $2 \cdot 10^6$ particles at sea level. The spatial distribution of the energy fluxes in the central part of the shower agrees with cascade theory calculations for values of the cascade parameter $s = 1.2$. It is shown that with increase of distance from the shower axis, the energy flux of the electron-photon component decreases more slowly than the energy flux of the nuclear-active component. Values of the energy carried by the electron-photon component in the central part of the shower are presented.

122. Extensive Air Showers

"On the Structure of the Core and the Central Regions of Extensive Air Showers at Sea Level," by S. N. Vernov, Ya. S. Babetskiy, N. N. Goryunov, G. V. Kulikov, Yu. A. Netchin, Z. S. Strugal'skiy, and G. B. Khristiansen, Institute of Nuclear Physics, Moscow State University, Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 4, Apr 59, pp 976-984

Experimental data are presented relating to the spatial distribution of the energy flux of the electron-photon and nuclear-active components in the core and central regions of extensive air showers. Appreciable fluctuations in the spatial distribution of the energy flux of the electron-photon and nuclear-active components occur in the core of the showers, as well as, apparently, in the central regions. Data have been obtained which indicate the existence of a specific correlation between the spatial distribution of the energy flux of the electron-photon component and the spatial distribution of the energy flux of the nuclear-active component of an individual shower.

123. Interaction Between High Energy Particles and Iron Nuclei

"Investigation of Interaction Between 10^{11} - 10^{12} eV Particles and Iron Nuclei," by N. L. Grigorov, V. S. Murzin, and I. D. Rapoport, Institute of Nuclear Physics of the Moscow State University, Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 4, Apr 59, pp 1,068-1,079

The following characteristics of the interaction between 10^{11} - 10^{12} eV cosmic ray particles and iron nuclei were studied at the altitude of 3860 m with aid of an apparatus permitting determination of the "primary" particle energy: (a) inelastic interaction cross-section; (b) degree of inelasticity of the interaction; and (c) distribution function of energy transferred to π^0 -mesons and also some other characteristics.

124. Nuclear Active Component of Showers

"On the Development of Nuclear Active Component of Extensive Atmospheric Showers, by S. N. Vernov, Ye. V. Gorchakov, I. P. Ivanenko, G. B. Khristiansen, Institute of Nuclear Physics, Moscow State University, Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 4, Apr 59, pp 1,233-1,239

The spectrum of the nuclear-active particles in extensive atmospheric showers, the particle and absorption ranges are computed, and the rate of structure bursts is estimated on basis of some simple assumptions regarding the nature of the elementary act. It is shown that besides extensive atmospheric shower characteristics which depend weakly on the nature of the elementary act, there are characteristics which are sensitive to the latter.

Mechanics

125. Displacement of Boundary Layer Calculated

"Displacement of Boundary Layers in the Interchange of Liquids or Gases," by Yu. A. Dem'yanov, Moscow; Moscow, Prikladnaya Matematika i Mekhanika, Vol 23, No 2, Mar/Apr 59, pp 370-375

The displacement of the boundary layers is determined for the situation when a fluid with a certain viscosity and kinematic viscosity is flowing around a semi-infinite plate and then, after a certain time, another fluid with different viscosities begins to flow around the plate. The velocity of both fluids is assumed to be constant.

The following problem is given as an example of those to which the results of the article may be applied: "A shock wave, behind which a gas flows with a certain velocity, strikes a plate which has a given velocity. After a certain time, the initial gas flow is replaced by another gas flow. If the shock wave and the surface of separation of the gases arise simultaneously at the leading edge of the plate, the problem is automodeling and the formulas derived can be used to solve it."

126. Expression Given for Flow of Liquid From Infinite Tube

Flow of a Liquid From an Infinitely Long, Axially Symmetrical Vessel," by Dzh. Salamatov, Frunze; Moscow, Prikladnaya Matematika i Mekhanika, Vol 23, No 2, Mar/Apr 59, pp 361-369

An integral differential equation is developed to describe the flow of a liquid from an infinitely long, axially symmetrical vessel. The equation is solved by the successive approximation method. The solution is used to obtain the form of the stream.

127. Cone-Water Entry Problem Studied

"Plane and Axially Symmetrical Automodeling Problems of the Immersion and Convergence of Streams," by E. P. Borisova, P. P. Koryukov, and N. N. Moiseyev, Moscow; Moscow, Prikladnaya Matematika i Mekhanika, Vol 23, No 2, Mar/Apr 59, pp 247-360

The general problem of the immersion of a solid conical body in a coaxial conical region filled with an ideal, incompressible, and weightless fluid is analyzed. The velocity of the body is an exponential function of time. Both plane and axially symmetrical cases are considered.

It is noted that the problem of the immersion of a wedge at constant velocity is a special case of the general problem and that an investigation of the nonsteady-state model of the explosion of a shaped-charge projectile with a conical casing may be reduced to this problem.

An approximation method is given for calculating the resistance and velocity curves along the free surface.

128. Theory of Flow in Diffusers Treated

"On the Flow Development of a Viscous Heat-Conducting Gas in a Pipe," by N. A. Slezkin, Moscow; Moscow, Prikladnaya Matematika i Mekhanika, Vol 23, No 2, Mar/Apr 59, pp 333-346

The flow development of a gas in a pipe is treated with consideration of viscosity and heat conductivity. An approximate solution is given in terms of a set of linear equations. It is remarked that the equations are of theoretical and practical interest in calculating engine diffusers and certain losses in gas flow in turbofrives and diffusers.

129. Pressure of Gas Jets on Plate Studied

"On the Theory of Gas Jets," by L. N. Sretenskiy, Moscow; Moscow, Prikladnaya Matematika i Mekhanika, Vol 23, No 2, Mar/Apr 59, pp 305-332

A solution and analysis of several problems in the theory of gas jets are given. The concentration of gas jets is studied first. Next, flow around a plate is considered, using the assumption that a region of null velocity is formed in front of the plate. It is commented that despite the evident difference in the two problems, they both have the same general property, namely, that the first is derived from the well-known problem concerning the jet flow of gas from an infinite container by substituting the point of null velocity at infinity with the entire infinite undisturbed region; in the second problem, this undisturbed region is considered to be in front of the plate.

Several other problems concerning gas jets are treated.

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130. Possibility of Using Magnetized Bodies in Magnetohydrodynamic Flow Considered

"Problems of Flow in Magnetohydrodynamics," by M. D. Ladyzhenskii, Moscow; Moscow, Prikladnaya Matematika i Mekhanika, Vol 23, No 2, Mar/Apr 59, pp 292-298

The problem of flow around bodies in which a magnetic field has been established by the flow of a conducting fluid is considered. The solution of the problem is given for large and infinite Reynolds numbers. The magnetic forces acting on the body are determined. It is shown that for large Reynolds numbers, magnetic forces act on the body which are analogous viscous friction and profile resistance. It is suggested that these forces be called respectively the force of magnetic friction and the force of magnetic profile resistance.

Also considered is the case when both a magnetic and electric field are established on the body. It is shown that sources of an electric field placed within the body do not influence the external flow on the body.

The problem arose in connection with studying the increased ionization of the air in the flow passing through the shock wave ahead of a high-speed flying apparatus and the possibility of using a magnetic field to act on the air flowing over the body.

131. Theory of Plasticity Without Independence Concept Attempted

"On a Possible Way of Constructing Plasticity Relations," by V. D. Klyushnikov, Moscow; Moscow, Prikladnaya Matematika i Mekhanika, Vol 23, No 2, Mar/Apr 59, pp 282-291

An approach is made toward formulating a theory of plasticity which includes the concept of an angular point on the surface of plasticity without applying the concept that certain elements are independent of the plasticity effect. A system of four assumptions is formulated and examined. Certain consequences of the theory are noted, and the relations between the stress and plastic deformation vectors are derived.

132. Rectangular and Wedge-Shaped Stampings on Plastic Plane Studied

"The Impression of Hard Stampings on a Plastic Half-Space," by D. D. Ivlev, Moscow; Moscow, Prikladnaya Matematika i Mekhanika, Vol 23, No 2, Mar/Apr 59, pp 274-281

The impression of rectangular and wedge-shaped stampings on a plastic half-space is investigated. The theory of a spherical deformed state is first considered, and the theory of a plane deformed state is taken as

a particular case. The generalization is based on the property of various coordinate system to include other systems as particular cases, as for example, the rectangular Cartesian coordinate system may be considered as a degenerate case of cylindrical and spherical systems.

133. Order of System of Equations for Bent Shell Lowered

"On the System of Differential Equations for the Equilibrium of a Shell of Revolution Subjected to a Bending Load," by V. S. Chernina, Leningrad; Moscow, Prikladnaya Matematika i Mekhanika, Vol 23, No 2, Mar/Apr 59, pp 258-265

It is shown that the order of the system of differential equations describing a shell subjected to a bending load may be lowered from eight to four without making any simplifying assumptions in the initial conditions.

134. Effect of Stampings on Elastic Plane Studied

"Towards the Solution of the Dynamical Problem of Elastic Theory for a Half-Plane Under Disturbed Boundary Conditions," by V. A. Sveklo, Petrozavodsk; Moscow, Prikladnaya Matematika i Mekhanika, Vol 23, No 2, Mar/Apr 59, pp 266-273

The problem concerning the dynamical effect of a system of stampings on an elastic half-plane is considered. The absence of friction and adhesion is assumed.

135. Dislocation Theory Applied to Theory of Shells

"Relationship Between Dislocations and Point Effects in the Theory of Shells," by K. F. Chernykh, Leningrad; Moscow, Prikladnaya Matematika i Mekhanika, Vol 23, No 2, Mar/Apr 59, pp 249-257

Quantities are introduced which directly characterize the deformation of a normal element associated with a given arbitrary line of the surface. The displacement vector is determined in terms of these quantities with the aid of a single contour integral. This is used to construct a theory of dislocations and to separate the parts which are not single-valued from the stress functions. These parts are said to result from the fact that loads on the contours of a multiply connected region are not self-equilibrating. The dislocation approach to problems on the effect of point forces and moments on a shell is emphasized.

Nuclear Physics

136. Plasma State Equated

"The State Equation of Plasma," by A. A. Vedenov and A. I. Larkin, Moscow State University, Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 4, Apr 59, pp 1,133-1,142

The free energy F of a completely ionized gas is derived in the form of an expansion in the density $F = F_{ideal} + A n^{3/2} + B n^2 \ln n + C n^2$.

The term $A n^{3/2}$ is identical with the familiar Debye-Hueckel term. Expressions for the functions B and C have been obtained. The diagram technique has been employed in the calculations.

137. Plasma Oscillations

"Electron Oscillations of Plasma," by A. A. Zaytsev, G. S. Leonov, and I. A. Savchenko, Moscow State University, Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 4, Apr 59, pp 1,332-1,334

Plasma oscillations were studied in inert gases. The pressure could be varied from $3 \cdot 10^{-1}$ to $5 \cdot 10^{-4}$ mm Hg. The oscillations were detected by a superheterodyne and a separate oscillator. The upper limit of oscillations has been found different for various gases. The limit was $2 \cdot 10^{-1}$ for He, 10^{-2} for Ar and for Xe $6 \cdot 10^{-3}$ mm Hg. During strong oscillations, an anomalous scattering of the beam could be observed visually. This scattering may occur before, as well as after, the pinch.

138. Spectroscopy of Ionized Plasma

The Broadening of Spectral Lines in a Strongly Ionized Plasma," by M. A. Mazing and S. L. Mandel'shtam, Physics Institute imeni Lebedev Academy of Sciences USSR, Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 4, Apr 59, pp 1,331-1,332

Preliminary measurements of line broadening and their shift in an arc discharge plasma showed a sharp qualitative disagreement of results with the theory by Weisskopf and Lindholm. The broadening and the shift of 50 Ar II lines and of a few lines of He I were measured in an arc discharge plasma at 30,000-40,000°K and an electron concentration of about 10^{17} cm^{-3} . The results were plotted in curves showing the relation of width and shift on a calculated parameter.

139. Plasma Oscillations

"Oscillations of a Plasma Beam in a Magnetic Field at Frequencies Close to Cyclotron Frequencies," by N. N. Lazukhin, Moscow State University, Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 4, Apr 59, pp 969-974

Plasma beam oscillations in a longitudinal magnetic field at frequencies which are several times smaller than the ion cyclotron frequencies are described. The method applied permitted the observation of the oscillation spectrum as a set of narrow lines with a very large signal-to-noise ratio. It is suggested that the observed oscillations are an analogue of hydromagnetic waves familiar from the theory.

140. Homogenization of a Reactor

An Approximative Method of Homogenizing of a Heterogeneous Reactor," by V. V. Smelov, Moscow, Atomnaya Energiya, Vol 6, No 5, May 59, pp 546-555

In the design of heterogeneous reactors, mostly the method of homogenization is used, based on the exchange of the heterogeneous reactor for a homogeneous one with efficient parameters. Computation of efficient cross sections of capture and fission is a rather simple problem, but the finding of the efficient diffusion coefficient involves serious difficulties and up-to-date methods for a reliable computation were not available. Important progress was attained in the work by Ya. V. Shevelev (Atomnaya Energiya, 2, 224 (1957)).

It is demonstrated that the problem of homogenization is essentially bound to the concrete functional, which depends on the setting of the problem. The general principle of homogenization is analyzed, by using k_{eff} as functional. It is shown that in the computation of heterogeneous reactors, the use of efficient cross sections of capture and fission, obtained by averaging along the spatial neutron spectrum in an infinite lattice results in an error in k_{eff} , proportional to the Laplacian of the reactor ². The endeavor to raise the accuracy leads to the fact that the efficient parameters lose their "universality," i.e., they become dependent on the geometry of the reactor. It is shown that the use of universal parameters eliminates, by principle, the possibility of obtaining a single value efficient diffusion coefficient, even if we consider neutron diffusion in a specified direction. Nevertheless, formulas are obtained determining the diffusion coefficient in a correct way. The obtained diffusion coefficient depends on the direction in the lattice. The homogenization method is analyzed for a plane, cylindrical and spherical cell geometry.

141. Spinors and Bosons

"Anomalous Spinors and Bosons," by A. M. Brodskiy and D. D. Ivanenko, Moscow State University, Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 4, Apr 59, pp 1,279-1,285

Spinors and bosons are considered which behave unusually under inversions and which obey anomalous commutation relations, indicated by Gelfand and Zetlin. The possibility of describing various particles by means of unusual wave functions is discussed.

142. Angular Distribution of Nuclear Radiation

"Angular Distribution and Angular Correlation of Radiations of the Nuclei With Oriented Electron Shells," by V. A. Dzhrbashyan, Physics Institute, Academy of Sciences of the Armenian SSR, Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 4, Apr 59, pp 1,240-1,245

The effect of an interacting oriented electron shell on the angular correlation of nuclear radiations is investigated. The angular distribution due to this effect is obtained.

143. Pair Production Energies

"Empirical Regularities in the Nucleon Pair Production Energies in Nuclei," by V. A. Kravtsov, Leningrad Polytechnical Institute, Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 4, Apr 59, pp 1,224-1,232

The variation of the pairing energies of nucleons and of the energy of the residual (np)-interaction of odd nucleons is investigated on basis of the most recent experimental data. It is found that the pairing energy not only depends on the total angular momentum of the nucleons, but also on the position of the pair in the nuclear shell and on the deformation of the nucleus. The decrease of the pairing energy with mass number A is slower than that predicted by theory. The pairing energy almost does not change if two nucleons of different types are added to the nucleus. The energy of the residual (np)-interaction of odd nucleons is not zero, decreases with A, and is smaller than the pairing energy.

144. Radiative Transitions

"On Radiative Transitions Between Rotational Levels in Spin $1/2$ Nuclei," by D. F. Zaretskiy, Moscow. Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 4, Apr 59, pp 1,129-1,132

The relative intensities of electric and magnetic transitions between rotational levels in spin $1/2$ nuclei are considered. The calculation is made for the coupling scheme previously proposed by the author. As an example, the Tm^{169} nucleus is considered. It is shown that the observed intensity ratio does not contradict the proposed coupling scheme.

145. Deuteron Induced Reactions

"Contribution to the Theory of Direct Nuclear Reactions Involving Polarized Particles," by G. L. Vysotskiy and A. G. Sitenko, Physicotechnical Institute of the Academy of Sciences of the Ukrainian SSR, Kharkov State University, Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 4, Apr 59, pp 1,143-1,153

The theory of direct nuclear reactions (stripping reaction and deuteron formation) involving polarized particles is considered. The angular distributions and polarizations of the products of direct nuclear reactions induced by polarized particles in oriented nuclei are determined by the perturbed wave method without account of spin-orbit coupling.

146. Meson Mass Spectrum

"Meson Mass Spectrum in Heisenberg's Theory," by Ya. I. Granovskiy, Institute of Nuclear Physics, Academy of Sciences of the Kazakh SSR, Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 4, Apr 59, pp 1,154-1,158

The meson mass spectrum is computed in Heisenberg's theory. Comparison of the results with the experimental data indicates that best agreement in the first approximation of the Tamm - Dancoff method is obtained for the scalar variant of the nonlinear term.

147. Elementary Interactions

"On the Kinematics of Elementary Interactions," by N. G. Birger and Yu. S. Smorodin, Physics Institute imeni Lebedev, Academy of Sciences USSR, Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 4, Apr 59, pp 1,159-1,167

Some kinematic methods of analysis of nuclear interactions of fast particles are considered. Analysis of the interactions observed in cloud chambers and photographic emulsions by this method yield the angular and energy characteristics of the interactions in the c. m.s. of the colliding particles.

148. Elementary Excitation Spectrum

"On the Properties of Elementary Excitation Spectrum Near the Disintegration Threshold of the Excitations," by L. P. Pitayevskiy, Institute of Physical Problems, Academy of Sciences USSR, Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 4, Apr 59, pp 1,168-1,178

The singularity of the Bose fluid Green's function near the excitation disintegration threshold is investigated by quantum field theory methods without assuming weakness of the interaction. It is shown that three possible types of decay thresholds exist. In the first case, the excitation velocity at the threshold point $p = p_c$ equals that of sound, thus starting from this point the excitation can produce phonons, which results in damping proportional to $(p_c - p)^3$. In two other cases, excitation in the threshold point can break up into two excitations with nonzero momenta which are either parallel to each other or form a definite angle. In both cases, the spectrum curve ends at the threshold point, and the excitation velocity at this point is equal to that of each of the excitations produced in the decay. Scattering of neutrons in the liquid involving the production of excitations near the threshold is considered.

149. Absorption of Mu-Mesons

"Absorption of Mu-Mesons by Polarized Nuclei. 1. The Angular Distribution of Neutrons," by E. I. Dolinskiy, Institute of Nuclear Physics, Moscow State University, Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 4, Apr 59, pp 1,179-1,184

A calculation is made of the angular distribution of neutrons emitted as a result of absorption of unpolarized μ^- mesons by polarized nuclei.

150. Rotational Nuclear Levels

"Excitation of Rotational Levels by Charged Particles," by A. D. Piliya, Leningrad Physico-Technical Institute, Academy of Sciences USSR, Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 4, Apr 59, pp 1,185-1,191

Scattering of charged particles by nuclei with large quadrupole moments is analyzed in the adiabatic approximation.

151. Computations of Li-6 and Li-7 Yields

"Nuclear Forces and Levels of the Lithium Isotopes," by V. V. Balashov, Institute of Nuclear Physics, Moscow State University, Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 4, Apr 59, pp 1,123-1,128

A refinement is introduced in the intermediate coupling model of the nuclear shell theory by taking into account spin-orbit interaction between the nucleons. Calculations made for Li^6 and Li^7 yield better agreement with the experiments than the usual intermediate coupling model, which takes into account only single particle spin-orbit interaction. Some indications are obtained with respect to the existence of different types of radial dependence of nuclear forces of various exchange nature.

152. Chew-Low Equations

"Dispersion Relations and Chew-Low Type Equations for Inelastic Processes Involving Mesons in a Case of a Fixed Source." by W. Zoellner, Joint Research Institute of Nuclear Research, Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 4, Apr 59, 1,103-1,109

The static dispersion equations and Chew-Low equations are established for the process $\pi + N \rightarrow \pi + N$. It is found that depending on how the variables are fixed, physically different dispersion relations and Chew-Low equations are obtained for the process under consideration.

153. Pion Decay

"On the Observation of $\pi^0 \rightarrow e^- + e^+ : e^- + e^+$ Decay," by Yu. A. Budagov, S. Viktor, V. P. Dzhelepov, P. F. Yermolov, and V. I. Moskalev, Joint Institute for Nuclear Research; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 4, Apr 59, pp 1,080-1,084

An event of charge-exchange scattering $\pi^- + p \rightarrow \pi^0 + n$ with subsequent decay $\pi^0 \rightarrow e^- + e^+ + e^- + e^+$ was detected on a photograph taken in a hydrogen diffusion chamber located in a magnetic field and bombarded with 160 MeV π^- -mesons. One decay of this type was detected per 2,500 events of π^0 -meson decays of the usual $\pi^0 \rightarrow 2\gamma$ type. The π^0 -meson mass is estimated as 141 ± 8 MeV. In the rest system of the π^0 -meson, the angle between the electrons and positrons of the pairs are 7° and 12° and the angle between the planes of the pair does not exceed 37° . Other possible explanations of the observed event seem to be very improbable.

154. Millisecond Half-Period Isomers

"Millisecond Half-Period Isomers Produced in Reactions Involving 14 MeV Neutrons," by V. L. Glagolev, O. M. Kovrizhnikh, Yu. V. Makarov, and P. A. Yampol'skiy, Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 4, Apr 59, pp 1,046-1,057

The short-lived γ -radiation produced by pulsed irradiation of a number of elements with 14.5 MeV neutrons was investigated. 43 elements were irradiated. Nine isomer activities with half-periods ranging from 10^{-3} to 10^{-1} sec. were detected in Mg, Al, Ga, As, Y, In, Pb and Bi. The half-lives and γ -ray energies were measured, and in some cases, the isomer production cross sections were estimated. Besides the Pb^{207m} and Bi^{208m} activities, all other isomer activities were produced in the neutron reactions for the first time. As a result, it has been possible to identify a number of the isomers and to discuss the possible decay schemes.

155. Anomalous Electron Scattering

"Anomalous Electron Scattering and Excitation of Plasma Oscillations." M. D. Gabovich and L. L. Paschnik, Physics Institute of the Academy of Sciences of the Ukrainian SSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 4, Apr 59, pp 1,025-1,033

The interaction between an electron beam and independently formed plasma which leads to a considerable change in the electron energy and to excitation of plasma oscillations has been investigated. The observed facts can be qualitatively interpreted by assuming that the electrons gather in clusters and that these clusters coherently interact with the plasma.

156. Mass Determination of a Charged Particle

"Mass Determination of a Charged Particle from Scattering and Residual Flight in Multiplate Cloud Chambers," by F. R. Arutyunyan, Physics Institute of the Armenian SSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 4, Apr 59, pp 985-991

The method of determination of the mass of a charged particle from its scattering and residual range in multiplate cloud chambers is experimentally checked by using it for determination of the masses of protons, μ - and π -mesons identified independently (from momentum-range data). The proton, μ - and π -meson masses derived from the corresponding multiple coulomb scattering curves are in good agreement with the correct values.

157. Ionization Potential of Uranium

"Determination of the Ionization Potential of Uranium Atoms by the Surface Ionization Method," by I. N. Bakulina and N. I. Ionov, Leningrad Physicotechnical Institute, Academy of Sciences USSR, Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 4, Apr 59, pp 1,001-1,005

A method is described for determination of the ionization potentials of two types of atoms which are simultaneously ionized on a heated metallic surface. The method has been checked by measuring the ionization potential differences of sodium and lithium. The difference of the ionization potential of uranium and lithium has been measured. The ionization potential of uranium has been found to equal 6.08 ± 0.08 V.

At high temperatures, the current of the positive ions of sodium, lithium, and uranium varies with the temperature in accord with the theoretical formula for surface ionization.

158. Strange Particles

"Generation of Strange Particles in the Interaction between 9 Bev Protons and Photographic Emulsion Nuclei," by N. I. Kostanashvili and O. A. Shakhulashvili, Joint Institute for Nuclear Research, Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 4, Apr 59, pp 1,006-1,011

The frequency of generation of "strange" particles in collision between high energy protons and photographic emulsion nuclei has been studied in the Laboratory of the Joint Institute of Nuclear Research. Experimental results for heavy mesons and hyperons are tabulated.

159. Neutron Half-Life

"Measurement of the Neutron Half-Life", by A. N. Sosnovskiy, P. Ye. Spivak, Yu. A. Prokof'yev, I. Ye. Kutikov, and Yu. P. Dobrynin, Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 4, Apr 59, pp 1,012-1,018

Attempt was made to improve the accuracy of computing the neutron decay period. The decay period was measured directly by making the decay protons pass through a system of diaphragms before entering the accelerating field. In the formula giving the time T of the neutron decay $T = kJ \log 2/N_p$, where J is the integral of neutron density at a cross section of the beam, the coefficient k depends on the geometry of the test equipment only. T has been found $T = (11.7 \pm 0.3)$ min.

160. Neutron Cross Section of Np-237

"The Total Neutron Cross Section of Np-237 Between 2 and 10,000 ev," by Yu. V. Adamchuk, S. S. Moskalev, M. I. Pevzner; Moscow, Atomnaya Energiya, Vol 6, No 5, May 59, pp 569-571

The total neutron cross section of Np-237 in an energy range of 2 to 10,000 ev was studied during 1956. Two samples of NpO_2 531gr/cm² and 0.702 gr/cm² containing 11.6% of Pu-239 were used for testing. The obtained cross sections versus energy were plotted, and the resonance energies were tabulated.

161. Low Energy Positrons

"Low Energy Positrons from $\mu^+ - e^+$ Decays," by A. O. Veissenberg, Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 4, Apr 59, pp 1,019-1,021

The value $\rho = 0.72 \pm 0.10$ for the Michel parameter has been obtained by analyzing available data on the spectrum of low energy positrons emitted in $\mu^+ - e^+$ -decays in photographic emulsions.

162. Bloc Physicists Meet in Hungary

"Colloquium on the Physics of Elementary Particles," by Ervin Fenyves; Budapest, Magyar Tudomány, Vol IV, No 2, Feb 59, p 99

The Lorand Eotvos Physics Society, with the support of Department III [Mathematical and Physical Sciences] of the Hungarian Academy of Sciences, organized a colloquium at Balatonvilagos, 17-20 September 1958, on the physics of elementary particles. Some 50 domestic and nearly 20 foreign physicists participated in the colloquium. It was opened by Academician Gyorgy Sziget, first secretary of the Lorand Eotvos Physics Society.

On the first day (cosmic ray and high-energy accelerator experiments), several reports dealt with the achievements of the Cosmic Ray Department of the Central Physics Research Institute [Hungary]. Prof V. Petrzilka reported on the work being done at the Charles University in Prague and in the Physics Research Institute of the Czechoslovak Academy of Sciences. J. Gierula spoke on the results of examinations using photoemulsion techniques, of high energy nuclear interactions performed in Warsaw and Krakow physics institutes. The theoretical work of D. S. Chernavskiy of the Physics Research Institute of the Academy of Sciences of the Soviet Union (FIAN, Moscow) on high-energy nucleon-nucleon collisions was related to this [Polish] work. G. B. Zhdanov and M. I. Tretyakova reported on cosmic ray work being done with emulsions in the FIAN. After the lectures, Prof M. Danys, deputy director of the Joint Institute for Nuclear Research, Dubna, acted as chairman for a debate on further problems of international collaboration in the area of emulsion research and for a discussion of the cosmic ray irradiation of a large emulsion block which took place at an altitude of 10-12 kilometers in a TU-104 airplane.

On the second day (beta decay and weak interactions), workers of the Central Physics Research Institute [Hungary] and of the Physics Institute of the Lorand Eotvos Science University reported on Hungarian achievements. Chou Guanchao (Joint Institute for Nuclear Research Dubna) reported on his theoretical work relating to the isotopic characteristics of elementary particles.

On the third day, Polish physicists, J. Rzewuski and J. Rayski, and workers of the Szeged Science University [Hungary] reported on problems of the relationship of the isotopic characteristics of elementary particles and geometric space. The workers of the Physics Institute of the Lorand Eotvos Science University discussed new methods in quantum field theory. K. Lanius (Berlin) reported on charge exchange dispersion of hyperons. Rumanian physicist A. Mihul (Joint Institute for Nuclear Research, Dubna) reported on uranium fission phenomena exhibited under the action of mu-mesons. Also on the third day, the coworkers of Academician Lajos Janossy [Hungary] reported on their achievements in connection with examinations of classical fluctuations of light.

On the fourth day, the workers of the Central Physics Research Institute, of the Physics Institute of the Lorand Eotvos Science University, and of the Theoretical Physics Group of the Hungarian Academy of Sciences reported on their theoretical work on the structure of elementary particles.

Solid State Physics

163. Atomic Ordering in Fe₃Pt Alloy

"Effect of Atomic Ordering on Exchange Interaction in the Fe₃Pt Alloy." by K. P. Belov and Z. D. Sirota, Moscow State University, Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 4, Apr 59, pp 1,058-1,062

The magnitude of the shift of the Curie point due to the pressure and spontaneous deformation of the lattice is computed from the data on measurement of the temperature dependence of magnetostriction in an alloy close to Fe₃Pt. It has been found that these quantities decrease with atomic ordering in the alloy. It is concluded that atomic ordering in Fe₃Pt not only changes the magnitude of exchange interaction, but also the nature of its dependence on the interatomic distance.

164. Superfluidity of Bosons

"On the Superfluidity of a System of Bose Polar Excitations,"
by S. V. Vonsovskiy and M. S. Svirskiy, Institute of Physics
of Metals, Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy
Fiziki, Vol 36, No 4, Apr 59, pp 1,259-1,266

The possibility of a superconducting state in metals is investigated in the case when the elementary current excitations of the electron system are quasi-bosons. The problem is solved by the Bogolyubov method within the framework of the "polaron" many-electron crystal mode. The conditions for possible existence of the superconducting state in a system of charged bosons have been deduced (low temperatures, low density of the quasi-particles, practical absence of "single-electron" transitions, and negative sign of the exchange integral). The phonon-induced interaction between the current Bose particles is of an attractive character and impedes the appearance of the superconducting properties of the latter. The dependence of the critical temperature of a superconductor with Bose current carriers on the crystal ion isotopic mass differs from that of a metal with a Fermi electron spectrum. This difference can be exploited to experimentally differentiate between "Fermi" and "Bose" superconductors.

Theoretical and Experimental Physics

165. Quantum Field Theory

"On Some New Dispersion Relations in Quantum Field Theory,"
by L. A. Khal'fin; Moscow, Zhurnal Eksperimental'noy i Teore-
ticheskoy Fiziki, Vol 36, No 4, Apr 59, pp 1,088-1,092

Some new dispersion relations between the module and phase shift of the forward scattering amplitude have been obtained. In contrast to the usual dispersion relations between the real and imaginary parts of the forward scattering amplitudes the present ones are independent of the detailed behavior (degree of increase or decrease) of the forward scattering amplitude at infinitely high energies. In connection with the deduced dispersion equations the problem concerning possible zeroes of the forward scattering amplitude in its region of analyticity is considered.

166. Production of Pairs by Quanta

"Polarization in the Production of Pairs by Circularly Polarized Quanta," by I. G. Ivanter, Institute of Scientific Information, Academy of Sciences USSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 4, Apr 59, pp 1,093-1,097

An analysis is made of the cross-section formulas for bremsstrahlung and pair production by photons on a coulomb center; the formulas are derived in the Born approximation without account of screening and recoil and for fixed polarization of all involved particles. Transformations have been derived which permit to obtain some of the formulas from the others; the transformations are employed to derive the pair production formula for circularly polarized quanta.

167. Quantum Statistics

"The Green's Function Method in Quantum Statistics," by Ye. S. Fradkin, Physics Institute imeni Lebedev, Academy of Sciences USSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 4, Apr 59, pp 1,286-1,298

A Green's function method in quantum statistics is developed. It is shown that the equations obtained contain in a simple approximation various methods encountered in statistical physics and in many-particle theory as well as their extension to cases of non zero temperature (e.g. the Debye -- Hueckel, Hartree -- Fock, Thomas -- Fermi, Gell-Mann and Brueckner methods). A transition to time-dependent Green's functions is considered and a method for determination of the energy spectrum of the system is proposed.

168. Lorentz Group

"The New Class of the Representations of the Total Lorentz Group," by G. A. Sokolik, Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 4, Apr 59, pp 1,098-1,102

All representations of the total Lorentz group are found. Those are shown to be reduced to the direct products of the spinor, representations, belonging to the three types. An attempt is made to interpret the isotopic spin in terms of the generalized parity operator without introducing any new degree of freedom. It is proved that the exclusion principle does not hold for the new class of spinors, transforming according to commuting operators of space, time, and space-time reflection.

169. Nonlinear Field Theory

"A Vacuum Nonlinear Effect in the Gravitation Theory," by N. V. Mitskevich Uzbek State University; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 4, Apr 59, pp 1,207-1,211

The second quantization theory leads to a new interaction between gravitons through virtual quanta of other fields. Then a vacuum cosmological term arises in the case of a scalar field and a slow variable metric; it is computed here by the Schwinger method. This circumstance is useful for interpretation of an additional scattering of gravitons by the Schwarzschild field through a vacuum of scalar particles, which becomes theoretically comparable with the nonlinear effect of the classical theory when the energies of gravitons are small.

170. Magnetic Probe

"Wall Probe in a Magnetic Field," by I. K. Fetisov, Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 4, Apr 59, pp 1,110-1,118

The current flowing to a wall probe in a strong magnetic field is computed in the case when the motion of the electrons along the magnetic field can be considered to be free and across the field-diffusional.

171. Piezoelectric Polarization Curves

"Contribution to the Theory of Piezoelectric Polarization Curves," by N. S. Akulov, Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 4, Apr 59, pp 1,085-1,087.

The principles of a polarization theory for single and many-domain piezoelectric crystals possessing one or two Curie points are developed for weak, strong, and medium fields at various temperatures. In contrast to the magnetization curve theory previously developed, it is assumed that in a first approximation rotation can be neglected. The various refinements can be introduced in a way similar to that employed in the magnetization curve theory.

172. Stability of Poiseuille Flow

"Stability of a Plane Poiseuille Flow of an Ideally Conducting Fluid in a Longitudinal Magnetic Field," by Ye. P. Velikhov, Moscow State University, Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 4, Apr 59, pp 1,192-1,202

The necessary and sufficient conditions for stability of a flow in a magnetic field have been found. It is shown that the critical value of the magnetic field which stabilizes the flow is $0.1 \cdot V_0 \sqrt{4\pi\rho}$ where V_0 is the velocity in the center of the channel and ρ is the fluid density.

173. Equation of Superconductivity Theory

The Fundamental Compensation Equation in Superconductivity Theory with Account of Coulomb Interaction," by Chen Chun-sian, Chow Shih-hsun, Moscow State University; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 4, Apr 59, pp 1,246-1,253

The Frölich model which takes into account coulomb interaction is investigated by the Bogolyubov method. To eliminate the infrared divergence of the expansion partial summation of the perturbation theory series has been performed by approximate second quantization. This yields in explicit form the fundamental compensation equation for dangerous diagrams and also the expression for the renormalized energy of single-fermion excitation with account of coulomb interaction.

174. Ferromagnetic Resonance

"Effect of Shape of the Specimen of Ferromagnetic Resonance in a Strong Radio Frequency Field," G. V. Skrotskiy and Yu. I. Alimov, Ural Polytechnic Institute; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 4, Apr 59, pp 1,267-1,271

The exact solutions of the Landau - Lifshitz equations for non-spherical ferromagnetic specimens in a radio frequency field of arbitrary amplitude are analyzed. An expression has been derived for the threshold field h_c above which unstability in the motion of the magnetization vector begins. The slow decrease of the magnetization component and the shift of the resonance field for field strengths $h_0 > h_c$ are explained. It is shown that for $h_0 > h_c$, the height of the absorption peak decreases and its width increases.

175. Shock Waves in Magnetohydrodynamics

"On the Disintegration of Unstable Shock Waves in Magnetohydrodynamics," G. Ya. Lyubarskiy and R. V. Polovin, Physicotechnical Institute, Academy of Sciences Ukrainian SSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 4, Apr 59, pp 1,272-1,278

The fate of an unstable magnetohydrodynamic shock wave is considered, and it is shown that such a wave must necessarily disintegrate into several waves among which there are fast and slow magnetoacoustic shock and similarity waves, Alfven discontinuities, and a contact discontinuity. It is significant that disintegration of an unstable shock wave is accompanied by an increase of the entropy. Disintegration of a stable shock wave is impossible.

176. Absorption of Ultrasound

"Anisotropy of Ultrasound Absorption in Metals in a Magnetic Field," by A. A. Galkin and A. P. Korolyuk, Institute of Radiophysics and Electronics, Academy of Sciences of the Ukrainian SSR, Physicotechnical Institute, Academy of Sciences Ukrainian SSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 4, Apr 59, pp 1,307-1,309

Experiments for studying the effect of the magnetic field on absorption of ultrasound in monocrystalline samples of very pure metals are described. The absorption coefficients of ultrasound in the magnetic field have been found to be irregular and the effects were different depending whether the magnetic field was parallel or perpendicular to the axis of the sample. The obtained results showed the explanations by A. B. Pippard (Phil. Mag., 2, 1147 (1957)) to be unsatisfactory.

177. Magnetization of Manganese Phosphide

"The Magnetization and Magnetocaloric Effect of Manganese Phosphide," by I. G. Fakidov and V. P. Krasovskiy, Institute of Physics of Metals, Academy of Sciences USSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 4, Apr 59, pp 1,063-1,067

The magnetocaloric effect and magnetization of manganese phosphide (MnP) is investigated at various field strengths in the temperature region of magnetic transformations. In contrast to Guillaud, the magnetic transformation temperature was not found to be dependent on the magnetic field strength. The character of the dependence of magnetocaloric effect on the temperature and magnetic field strength and also the temperature dependence of the spontaneous magnetization indicate the existence of a Curie point at 22° C.

The results obtained are discussed from the viewpoint of the s - d -exchange model of ferromagnetism.

178. Magneto-optical Resonance

"Magneto-optical Resonance in Nickel at Infrared Frequencies," by G. S. Krinchik and R. D. Nural'yeva, Moscow State University; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 4, Apr 59, pp 1,022-1,024

Resonance absorption of infrared light in nickel has been detected by a magneto-optical method. The resonance wave length of $4 + 5 \mu$ corresponds to the reorientation energy of the electron spin magnetic moment in the exchange field of a ferromagnetic.

179. He-3 Cryostats

"He-3 Cryostats," by V. P. Peshkov, K. N. Zinov'yeva, and A. I. Filimonov, Institute of Physical Problems, Academy of Sciences USSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 4, Apr 59, pp 1,022-1,037

Apparatus is described with aid of which temperatures below 1° K can be attained and maintained by pumping out He^3 vapor. Temperatures down to 0.3° K were obtained in a transparent glass apparatus possessing a volume of about 1 cm^3 . In a metallic continuously operating apparatus containing 140 cm^3 of liquid He^4 , a temperature from 0.5° K and higher was maintained with a heat conduction of $7 \cdot 10^{-4} \text{ W}$.

180. Tin Resistance at Low Temperature

"Measurement of the Resistance of High Purity Tin at Helium Temperatures," by V. B. Zernov and Yu. V. Sharvin, Institute of Physical Problems, Academy of Sciences USSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 36, No 4, Apr 59, pp 1,038-1,045

The resistance of a number of single crystals of tin of differing purity has been measured. The resistance was deduced from the magnitude of the moment of the forces acting on the conducting specimen in a rotating magnetic field. The anisotropy of the resistance, the temperature dependence of the resistance between $4.2 - 3.73^{\circ}$ K, and the magnitude of the residual resistance have been measured. For the purest of the specimens, the residual resistance was approximately $3.7 \cdot 10^{-11} \Omega$. cm, which corresponds to an electron mean free path of about 3 mm.

VIII. MISCELLANEOUS

181. Academic Center To Be Built in Baku, Azerbaydzhane SSR

"Toward the Fulfillment of a Dream," by Z. Khalilov, Active Member, Academy of Sciences Azerbaydzhane SSR; Baku, Bakinskiy Rabochii, 1 Jan 59

An academic center (akademicheskii gorodok) is being planned for the city of Baku. The center will be located in the Nagornyy area of Baku and will consist of the following institutes: Chemistry; Physics; Power Engineering; Mathematics and Mechanics; and Social Sciences. On Piruli Hill in Shemakhinskiy Rayon, a Solar Astrophysical Observatory will be built. The above institutes, observatory, and the Institute of Petrochemical Processes, Academy of Sciences Azerbaydzhane SSR, in Sumgait will comprise the new academic center.

182. New Scientific Institutes Established in USSR

(Untitled and unsigned articles) Baku, Bakinskiy Rabochii, 8 Mar 59; Moscow, Izvestiya, 13 Feb 59; Moscow, Vestnik Akademii Nauk SSSR, No 4, Apr 59

The following new institutes have recently been established in the USSR:

Scientific Research Institute of Plant Protection (Nauchno-Issledovatel'skiy Institut Zashchity Rasteniy), Academy of Agricultural Sciences Azerbaydzhane SSR, in Kirovabad. G. Ibragimov, director. (Baku, Bakinskiy Rabochii, 8 Mar 59)

Central Scientific Research Institute of the Maritime Fleet (Tsentral'nyy Nauchno-Issledovatel'skiy Institut Morskogo Flota), in Vladivostok. (Moscow, Izvestiya, 13 Feb 59)

Institute of Geology and Exploitation of Combustible Fuels (Institut Geologii i Razrabotki Goryuchikh Iskopayemykh), Siberian Department of Academy of Sciences USSR. (Moscow, Vestnik Akademii Nauk SSSR, No 4, Apr 59)

183. Czechoslovak Research Efforts Altered

"Reorganization of Czechoslovak Research" (unsigned article);
Prague, Hospodarske Noviny, No 15, 10 Apr 59, p 4

The Czechoslovak Academy of Sciences has prepared recommendations for new measures in the organization of research institutes to be implemented by 1960. This plan has now been approved by the Czechoslovak government. The recommendations apply to all research units except advanced schools, the research work of which will be considered during 1959, and affect 346 research centers and about 43,000 research workers. Thus far less than one half of the research institutes of the various sectors, comprising a total of 15,000 workers, have been transferred to economic production units.

The recommendations will result in further simplification of the scientific research network, will improve the work of the research centers, and will provide substantial savings. Research workers will have greater opportunity for direct contact with production enterprises designated to implement the results of their research.

184. Dissertation Topics in Hungary

"Reports From the Scientific Qualifications Committee -- New Doctors and Candidates, December 1958" (unsigned article);
Budapest, Magyar Tudomány, Vol IV, No 2, Feb 59, pp 104-106

The Scientific Qualifications Committee has qualified Zalan Bodo as doctor of physical sciences on the basis of his dissertation titled "Charge Carrying and Potential Distribution of Semiconductors." His opponents were Academician Pal Gombas, Doctor of Physical Sciences Rezso Gaspar, and Doctor of Physical Sciences Tibor Hoffman.

The committee has qualified Janos Giber as candidate in chemical sciences on the basis of his dissertation titled "An Examination of the Kinetics of Nitration Reactions Taking Place Between Methane and Nitric Acid Vapor." His opponents were Academician Tibor Erdey-Gruz and Candidate in Chemical Sciences Ferenc Tudos.

The committee has qualified Peter Hedvig as candidate in physical sciences on the basis of his dissertation titled "An Examination of Magneto-Optical Phenomena in Microwaves." His opponents were Doctor of Physical Sciences Tibor Hoffmann and Doctor of Physical Sciences Elemer Nagy.

185. Hungarians Report on East German Scientific Achievements

"In the German Democratic Republic" (unsigned article);
Budapest, Ujtitok Lapja, Vol II, No 9, 5 May 59, p 10

The radio telescope of the Heinrich Hertz Institute has a diameter of 36 meters. The structure was designed by Engineer Frey. The maximum deviation from a perfect parabola is only 2 millimeters.

Manfred von Ardenne, a professor at the Dresden Technical University, has designed a radio transmitter for physicians. The radio can be swallowed like a pill and transmits data on pressure and acidity (pH values). The "pill" is 2.6 centimeters long.

German specialists are also working on a reading machine, primarily for bookkeeping and economic use. The patent of Engineer Mahrlein involves a special cathode ray tube. Here the registration of each symbol depends on the appearance of an extremity minimum. This occurs if a mark on the pattern agrees exactly with the picture on the tube, that is, if there is optic congruence. Then the switch opens and the symbol is registered according to this position. This device can be used only with numbers because a pattern containing every letter would not fit into it.

A Central Institute for Nuclear Physics has been built near Dresden. The experimental reactor was supplied by the USSR. The fuel for the reactor is placed in 52 aluminum cases. Water is used as moderator and as coolant. Eight of the control rods are of boron-carbide and one is of steel.

186. New Book on Chinese Science Announced

"Chinese Science in the Past Decade" (unsigned article);
Peiping, K'o-hsueh T'ung-pao (Scientia), No 9, 1959,
p 309

This item announces the forthcoming publication of a "huge" set of books which sums up China's scientific achievements during the past 10 years. Shih-nien-lai Chung-kuo ti K'o-hsueh (Chinese Science in the Past Decade), as the work is tentatively called, will give an account of China's scientific investigations and present status in approximately 30 major fields and over 200 subfields. It will be "a highly technical work of use of specialists and others interested in science." Research agencies and higher schools all over the country are contributing information.

The compilation of this work was organized in November 1958 by the Academia Sinica in compliance with the directive of the State Commission of Science and Technology. The first volumes will come off the press sometime before 1 October 1959, the article says.

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